# PSYCHOSOCIAL ADJUSTMENT IN CHILDREN TREATED FOR ACUTE LYMPHOBLASTIC LEUKEMIA

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# ABSTRACT

Title: PSYCHOSOCIAL ADJUSTMENT IN CHILDREN TREATED FOR ACUTE LYMPHOBLASTIC LEUKEMIA

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Children who are diagnosed and treated for Acute Lymphoblastic Leukemia (ALL) undergo extensive and painful medical treatments. Treatment for ALL has included chemotherapy, either used alone or with cranial irradiation. Identified symptoms linked with survivorship have included learning problems, cognitive problems, and social disabilities. While most studies in this area have focused on neuropsychological impairments in ALL survivors, the purpose of this study was to identify problems with adjustment in daily living in ALL survivors. The results of this study indicate that children who have been treated for ALL exhibit deficits in several domains, including adaptive abilities, emotional and behavioral functioning, as well as academic functioning. Future research should focus on obtaining larger sample sizes so that comparisons can be made between ALL survivors who have been treated with chemotherapy only versus ALL survivors who had been treated with both chemotherapy and cranial irradiation.

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# CHAPTER I

# INTRODUCTION

Acute Lymphoblastic Leukemia (ALL) is the most common form of childhood cancer. St. Jude Children's Research Hospital (2003) estimates that in the United States 3,000 children are diagnosed with this form of cancer yearly, typically between the ages of 3 and 5 years old (http://www.stjude.org /disease studies/ALL.html). Before the 1960's, the rate of mortality was almost 100 percent (Precourt et al., 2002). With improved medical practice, approximately 99 percent of all newly diagnosed children with ALL will obtain initial remission during the first four to six weeks of treatment (http://www. stjude.org/diseasestudies/ALL.html). As cited by St. Jude Children's Research Hospital (2003), it's estimated that 80 percent of the children who are treated for ALL will ultimately be cured of the disease (http: //www. stjude.org/disease studies/ALL.html).

Since the rate of survival of childhood cancer has become more of a reality, the quality of life and the psychological effects of cancer and its treatment have grown in importance (Butler, Rizzi, & Badilla, 1999). The work completed by Koocher, O'Malley, Gogan, and Foster (1980) began to focus some attention on the problems in psychological adjustment experienced by childhood cancer survivors. This work empirically identified that childhood cancer survivors "experience residual psychosocial sequelae" (p. 172). In essence, while the disease itself may have been treated effectively,

the psychological implications of the cancer and treatments were much more longstanding.

For years, the most typical form of treatment included cranial irradiation therapy combined with different forms of chemotherapy. As research continued in the pediatric oncology field, this treatment combination was found to have adverse effects on a child's life. The long-term sequelae of this treatment combination include: brain scan abnormalities, problems with growth, puberty, and cardiac/pulmonary functioning, the development of second cancers, learning problems that impact academic achievement, social problems, and impairments in cognitive and neuropsychological functioning (Reeb & Regan, 1998). To prevent these severe effects of treatment, cranial irradiation has been used much less often. The most current treatment involves a combination of several chemotherapy regimens.

Although the medical community has become more aware of the harmful effects that cranial irradiation with chemotherapy can have on a child's life, many concerns are still prevalent in survivors of childhood cancer. In many ways, the medical field may have overlooked the psychological effect that cancer treatment has on a child's future. Even though prevalent complications of cranial irradiation therapy have been identified, attention must still focus on the psychological sequelae of the "intensive, intrusive, and often life-threatening experience" that patients and parents have been forced to endure (Kazak, 1998, p. 60). The purpose of this study was to identify problems with adaptation in daily living, behavioral and socioemotional functioning, and obtain a parental report of academic functioning in children who have been diagnosed and treated for Acute Lymphoblastic Leukemia.

This thesis is organized into several major chapters. The first chapter presents a brief description of ALL, including the common therapies of cranial irradiation and chemotherapy. Also, this chapter provides a brief review of the literature on brain defects associated with cranial irradiation, as well as the sequelae of cranial irradiation and chemotherapy. The specific hypothesis of this study is delineated at the end of the chapter. In the second chapter, the methods and procedures of the present study are discussed. Finally, the third and fourth chapters, respectively, will present the results and the implications of these results, as well as recommendations for future research.

## Acute Lymphoblastic Leukemia: A Brief Description of the Disease

Acute Lymphoblastic Leukemia (ALL), the most common form of childhood leukemia, has served as the model for cancer therapy and research on other malignant diseases for both children and adults (Steen & Mirro, 2000). While the cause of ALL is not completely known, several indicators are related to a higher chance for developing the disease. One finding that has led researchers to believe that the disease is caused by some form of genetic anomaly is the fact that identical twins tend to develop the disease within a short time of each other (Steen and Mirro, 2000). Also, St. Jude Research Hospital (2003) states that ALL is more commonly diagnosed in boys than in girls (http: //www. stjude.org/disease studies/ALL.html). The environment may also play a role in the development of the disease, with some research suggesting that exposure to ionizing radiation is a possible factor in the development of the disease (Buckman, 1997).

ALL develops when the white blood cells, known as lymphocytes, begin to grow abnormally. Lymphocytes, which include T-cells and B-cells, help to prevent infection and provide immunity from diseases (Keene, 1997). ALL begins to develop when the

bone marrow overproduces malignant, immature lymphocytes known as lymphoblasts. The lymphoblasts multiply at an alarming rate, and interfere with, and eventually over-power, the healthy white blood cells, red blood cells, and platelets. The lymphoblasts will be carried through the blood and may eventually affect the lymph nodes, causing them to swell. The frequent symptoms associated with the diseases include: constant fever, weakness, frequent infections, pain in the bones and joints, anemia, shortness of breath, or bruising/easy bleeding (Buckman, 1997).

Different Treatment Options and Their Unintended Biological Effects

Over the last 30 years, the treatment methods for childhood cancer have changed dramatically. While children who were diagnosed with the disease in the 1960's had a five-year survival rate of 4%, the rate of survival has improved significantly (Regan & Reeb, 1998). Recent figures published by St. Jude Research Hospital (2003) show a survival rate of 80% (http: //www. stjude.org/disease studies/ALL.html). The introduction of Central Nervous System Prophylactic Treatment (CNSPT) is one of the main reasons why the survival rate for childhood cancer has increased at such a monumental rate. CNSPT often consisted of: (a) cranial irradiation therapy and/or (b) chemotherapy (such as methotrexate) injected intrathecally (e.g. injected directly into the spinal fluid) (Regan and Reeb, 1998). Radiation therapy sends high-energy x-rays directly into the cancerous cells, damaging the cells in such a way that they cannot continue to mature and divide (Gaes & Gaes, 1992). Specifically, radiation therapy relies on high-energy electron beams, or radioactive isotopes, to shrink and destroy areas of cancerous growth (Murphy, Morris, & Lange, 1997). Most often, radiation therapy is measured in Gray Units (Gy), which refers to the amount of radiation energy that is

absorbed by the body. Chemotherapy is administered intrathecally because peripherally administered chemotherapy is unable to pass the blood-brain barrier (Flethcer & Copeland, 1988).

While CNSPT has been shown to effectively treat relapses of the cancer, it has also been found to have serious implications in terms of the level of toxicity to the central nervous system and brain. Bleyer (1998) found that when individuals received cranial irradiation, intrathecal methotrexate, and intravenous methotrexate, the neurotoxicity (the detrimental effect on the nervous system caused by the therapies) rate of the treatment increased. It was then hypothesized that one treatment made each of the other treatments more toxic, such that the interactive effect was greater than what was expected with each of the individual treatments.

Hertzberg et al. (1997) studied the late effects of cranial irradiation therapy on possible morphological central nervous system (CNS) side effects of children cured of acute lymphoblastic leukemia (ALL). The study examined whether a therapy regimen using cranial irradiation with a maximum dose of 18 Gy induced more morphological changes in the CNS than a regimen without irradiation. It was concluded that children receiving cranial irradiation in low doses between 12 and 18 Gy in combination with systematic medium-high-dose methotrexate and/or intrathecal methotrexate were at greater risk for developing brain damage than those individuals who only received either chemotherapy or cranial irradiation. Furthermore, the number of alterations seen in the brain structure of cranial irradiation patients was higher than those found in non-irradiated patients. Interestingly, brain alterations were still apparent in some individuals who only received chemotherapy. Brain alterations included the widening of the sulci or

ventricles, a usual sign of brain atrophy. The combination of both cranial irradiation and intrathecal methotrexate appeared to be linked to the subsequent morphological brain alterations.

Identified Impairments in Studies Assessing the Use of Cranial Irradiation

In past research (reviewed by Reeb and Regan, 1998), morphological changes were found to be directly associated with the neuropsychological impairments that are identified in many childhood cancer survivors. Specifically, autopsy investigations have found retardation and/or necrosis (death of normal cells) of white brain matter and calcification in the basal ganglia, frontal cortex, and several connecting structures. These physiological findings suggest that the necrosis of white matter in the basal ganglia and the extensions to the frontal cortex may be implicated in some identified deficits (e.g. fine-motor functioning), and that the damage identified in the frontal lobe may account for other neuropsychological impairments (e.g. attention and executive functioning). Furthermore, the nonverbal deficits (e.g. visual-motor integration, visuospatial ability) are usually associated with the right hemisphere. Rourke (1987) states that the ratio of white matter (long myelinated fibers) to the grey matter (neuronal mass and short non-myelinated fibers) is higher in the right than in the left hemisphere. Since children who have been treated for cancer tend to have some white matter dysfunction, Rourke (1987) argued that childhood cancer survivors are likely to experience a nonverbal learning disability syndrome.

Rowland et al. (1984) was one of the first studies that identified cranial irradiation as the cause of more substantial cognitive deficits when used with chemotherapy. The researchers in this study found that more cognitive deficits were present in children who

had received CNS therapy that included cranial irradiation. When comparing the children who had received intrathecal methotrexate alone or with intravenous methotrexate, those children who had received the intrathecal methotrexate, along with cranial irradiation, showed much more difficulty in terms of intellectual functioning and several neuropsychological measures, such as finger-tapping, grip strength, tactual performance, symbol recognition, and visual reception.

In a study by Regan and Reeb (1998), it was hypothesized that ALL survivors who received both cranial irradiation and intrathecal chemotherapy would show impairments in nonverbal areas, such as visual organization, fine-motor coordination, visual-motor integration, and visuospatial memory. This study also examined the performance of these ALL survivors on visual motor tasks that place an increased emphasis on speed and attention. When the performance of ALL survivors who received both cranial irradiation and chemotherapy was compared to normative data, a group of "healthy" peers, and a group of ALL survivors who received chemotherapy only, the above hypothesis was supported.

Copeland et al. (1985) sought to assess the effects of various cancer treatments on neuropsychological functioning. Comparisons of neuropsychological performance were made between three groups of cancer survivors: (1) leukemia or lymphoma patients who had been treated with intrathecal chemotherapy but did not receive irradiation; (2) leukemia or lymphoma patients who had been treated with intrathecal chemotherapy as well as cranial irradiation; and (3) tumor patients who had not been treated with intrathecal chemotherapy or irradiation, but had received standard chemotherapy protocols, surgical excision, and irradiation to localized sites. The researchers found that

patients who had received intrathecal chemotherapy as well as cranial irradiation scored significantly lower than the other two groups on nonlanguage skills: visual motor integration, arithmetic, coding, spatial memory, and fine motor skills. Despite these lower scores, significant differences between the three groups were not found on measures of language, verbal memory, and reading. Furthermore, age at diagnosis was less important than the type of treatment received, with patients receiving the combined treatment of intrathecal chemotherapy and cranial irradiation exhibiting lower performances regardless of when the cancer was diagnosed. There were also indications that children who were diagnosed and treated with cancer before the age of 5 were more likely to have cognitive difficulties.

A wealth of research has been completed on the neuropsychological and cognitive deficits that accompany cranial irradiation treatment (Copeland, et al.,1985; Fletcher & Copeland, 1988; Mulhern, Fairclough, & Ochs, 1991; Ochs, et al., 1991). As delineated below, reviewers of this research have drawn a number of conclusions (Brown & Madan-Swain, 1993; Fletcher & Copeland, 1988; Madan-Swain & Brown, 1991; Reeb & Regan, 1998).

First, the long-term impairments of cranial irradiation and chemotherapy seem to have a later onset. The impairments have been identified in the following functions that are associated with the frontal lobe and right hemisphere: visual-motor integration, visuospatial ability, visual perception and scanning, fine motor skills, nonverbal and sequential memory, attention, concentration, and impulsivity. The research also has concluded that language and verbal reasoning abilities are less affected by the treatment. However, when cranial irradiation is administered during a child's early years (i.e.

preschool age), subsequent neuropsychological impairments tend to be more pervasive and severe, and are more likely to include damage to verbal functioning.

Second, research has found that latent impairments of cancer treatment may be due to future obstruction of developmental processes. As explained by Majovski (1989), most brain structures and associated functions are developed by age 4, but white matter (myelination) and the cortex continues to form through adolescence and early adulthood, with the large areas of myelinization in the basal ganglia and extensions to the frontal lobe developing during childhood. After reviewing the research, Reeb and Regan (1998, p. 64), conclude the following:

> The declines in age-related standard scores are believed to represent a delay in (or lack of acquisition of) the development of new abilities, as opposed to a deterioration in abilities already developed. In other words, the effects of the CNSPT on later neurological development are believed to be greater than its effects on structures already developed at the time of treatment.

Third, females tend to experience more severe neuropsychological impairments, but the reason for this discrepancy between the sexes is unknown. Reeb and Regan (1998) argue that future longitudinal research needs to examine the way in which the treatment interacts with gender role socialization and/or sex-based differences in brain development.

Given these identified impairments, the medical community acknowledged the need to move away from cranial irradiation, when possible. Recently, cranial irradiation has been reserved for cases with: (a) poor prognosis, (b) central nervous system disease at diagnosis, or (c) central nervous system-relapse (Brown, et al., 1996; Reeb & Regan, 1998).

The Sole Use of Chemotherapy: Outcomes for ALL Survivors

As reviewed by Reeb and Regan (1998), numerous studies yield findings similar to those noted above. Once cranial irradiation was identified to have a more drastic impact on a child's developmental and adjustment abilities, attention turned to the assessment of the impact that intrathecal chemotherapy, when used alone, had on development in ALL survivors.

Brown et al. (1992) sought to determine whether chemotherapy alone might be a source of central nervous system damage. The researchers found that the children who had completed a 3-year course of chemotherapy, but were no longer receiving chemotherapy treatment, were more impaired in tasks of higher-order cognitive functioning than those children who had been newly diagnosed with leukemia or those children who had been diagnosed one year earlier. The children who had completed a 3-year course of chemotherapy performed significantly poorer than the other groups on perception and organization of stimuli, short term memory, focused attention, and complex motoric abilities (especially eye-hand activities). The children who had completed a 3-year course of chemotherapy also showed greater impairment in non-verbal symbolic reasoning. These results support the need for careful follow-up of ALL survivors throughout the treatment period and after termination of chemotherapy.

Brown, Sawyer, Antoniou, Toogood, and Rice (1999) assessed whether children who received chemotherapy developed unanticipated cognitive problems when compared to children who did not receive chemotherapy. Although these researchers noted that the group that did not receive chemotherapy consisted of cancer patients, the type of cancer treatment that this group received was not reported. The results of the study suggested

that children who received chemotherapy compared to those children who did not receive chemotherapy experienced detrimental effects in their academic skills (spelling, reading, and arithmetic) during the years that followed diagnosis. The children who received chemotherapy did not show any improvement with age in intellectual functioning as was found in children who did not receive chemotherapy. In other words, the developmental advancements seen in children were not evident in the children who had been treated with chemotherapy. This suggests that they failed to progress in the same manner as the children who did not receive chemotherapy treatment. Contrary to the results of Brown et al. (1992) and other studies (Copeland et al., 1988; Dowell et al., 1989; Reeb & Regan, 1998), which found that the effects of chemotherapy were not as severe as those identified with the use of cranial irradiation, the findings of Brown et al. (1999) suggest that some negative effects of chemotherapy may be as severe as the effects seen with cranial irradiation therapy.

Brown et al. (1998) studied the cognitive and academic late effects of children who had survived ALL. A comparison group was not used for this study. The researchers hypothesized that children and adolescents who had successfully been treated for ALL with intrathecal chemotherapy would show cognitive and academic impairments relative to the norms of psychometric instruments. Furthermore, they hypothesized that cancer survivors would show greater deficits on nonverbal tasks and would display poorer academic functioning in mathematics when compared to the general population. Based on past research reviewed earlier, girls were predicted to perform worse on measures of cognitive tasks and academic functioning, and children diagnosed at a younger age were expected to have greater neurocognitive impairments. The researchers found that

survivors' performance on verbal and nonverbal tasks were significantly lower than the norms, with scores on nonverbal tasks significantly lower than scores on verbal tasks. The researchers also were able to identify fine-motor deficits.

Adjustment Issues After Completing Therapy

While research on adjustment has not specifically focused on the ALL population, studies have assessed how chronic illness impacts a child's ability to adjust to normal life. Haase and Rostad (1994) sought to explore children's perspectives on life upon the completion of cancer treatment. Six central themes emerged from the interviews conducted for this study: a gradual realization of normal; hierarchical and cyclical recurrence of fears; completion embedded in the cancer experience (ie. understanding that the medical treatments have ceased); seeking a "normal" life; modifying current relationships; and a resolution to move forward. These themes indicated that the completion of treatment is two-sided - one of celebration and hope and the other of uncertainty and fear.

In the research completed by Noll, Bukowski, Rogosch, LeRoy, and Kulkarni (1990), the social skills and psychological adjustment for survivors of childhood cancer were investigated. In this study, relative to the matched controls, children with cancer were perceived as less sociable and more socially isolated and withdrawn. Specifically, the picture that emerges from this study is that children tend to have fewer leadership and positive social skills. In addition, they tend to be more disengaged from peers and have difficulties coping with daily academic and/or interpersonal classroom demands.

In addition to these findings, research has identified concerns with emotional factors both during and after the completion of treatment. Frank, Blount, and Brown

(1997) underscored the importance of assessing depressive attributional style and avoidance coping in examining a child's risk for developing emotional and behavioral difficulties that are related to the cancer experience. One predictor for the development of depressive symtomology has been a depressive attributional style (Schoenherr, Brown, Baldwin, & Kaslow, 1992).

The Present Study

Although a wealth of literature has been completed assessing the impact of cancer treatments on a child, the emphasis within the literature has been placed on the cognitive, academic, and neuropsychological effects of chemotherapy treatments, either used alone or in combination with cranial irradiation. However, the adaptive functioning problems that might arise as a result of the cancer treatment is not prevalent within the literature. More specifically, the Vineland Adaptive Behavior Scales (Sparrow, Balla, Cicchetti, 1984), the most commonly used instrument to assess adaptive functioning, has never been utilized in the ALL population, based on this literature review. This study assessed childhood cancer survivors who were treated with chemotherapy and cranial irradiation, and these results were compared to a healthy group of children. In addition, the main focus of the study was on adaptation in daily living, an important factor in the child being able to acclimate oneself to a normal home and school environment. As discussed by Butler (1998), cognitive orientating and directing skills are directly impacted by attentional processes that are weakened as neurocognitive side effects of cranial irradiation and some chemotherapies. Therefore, the way a child is able to function on a daily basis may be significantly inhibited by these neurocognitive deficits, both at school and at home.

In essence, the study examined the hypothesis that adjustment problems would be present in children who have been treated for cancer. A second hypothesis delineated in this study is that children who were treated for ALL would exhibit more behavioral problems, as measured by the Child Behavior Checklist, than the children in the healthy comparison group. Thirdly, the children who were treated for cancer were hypothesized to exhibit more academic problems as reported by parents, when compared to the children of the healthy comparison group.

The American Association of Mental Retardation (AAMR, 1992) defines adaptive behavior as the effectiveness with which individuals meet the standards of personal independence and social responsibility that is expected of individuals of a given age and culture group. Adaptive behavior can be assessed by focusing on two major issues: (1) the degree to which individuals are able to function and maintain themselves independently, and (2) the degree to which they meet culturally imposed demands of personal and social responsibility. The present study seeks to assess the ability of cancer survivors who have been treated with chemotherapy to appropriately adapt to normal daily living demands as compared to children who have never been treated for cancer.

# CHAPTER II

# METHOD

## Participants

Participants included 30 parents of ALL-diagnosed individuals and 30 parents of "healthy" age/gender/SES-equivalent individuals in a matched comparison group. While the two groups were matched by gender in all instances, there were occasions where matching was not exact for the age and SES for the two matched children ($N$=17). Specifically, some instances required the matching of a child based on exactly similar age and gender, but the family's SES level was nonequivalent ($N$=8). In addition, some cases required that two parents were considered a match if the children identified for use in this study were within plus or minus one year of age from each other as well as within the same SES level ($N$=9).

The children of the "healthy" matched comparison group ranged in age from 5 years, 2 months to 17 years, 6 months (15 males and 15 females). The children of the ALL parents ranged in age from 5 years, 2 months to 17 years, 9 months (15 males and 15 females). As expected, there was not a significant difference between the ages of the children in the cancer group ($M$ = 10 years, 0 months; $SD$ = 3 years, 7 months) and the healthy comparison group ($M$ = 10 years, 1 month; $SD$ = 3 years, 6 months), $t$ (58) = -.110, $p$ = .913.

There were 18 children ($M$ = 9 years, 2 months; $SD$ = 3 years, 11 months) who were treated with chemotherapy only. There were 5 males and 13 females within this group. There were 12 children ($M$ = 11 years, 9 months; $SD$ = 3 years, 2 months) who were treated with a combination of chemotherapy and cranial irradiation. Within this group, there were 10 males and 2 females.

Parents reported that the age of diagnosis for those children treated for cancer ranged from 9 months to 14 years, 0 months ($M$ = 5 years, 11 months; $SD$ = 3 years, 1 month). For the cancer subgroups, parents reported that age of diagnosis for those children treated only with chemotherapy ranged from 9 months to 12 years, 6 months whereas those children treated with a combination of chemotherapy and cranial irradiation ranged in age from 2 years, 2 months to 14 years, 0 months. A significant difference in the age of diagnosis was not found between the chemotherapy group ($M$ = 4 years, 8 months; $SD$ = 2 years, 11 months) and the combined treatment group ($M$ = 5 years, 3 months; $SD$ = 3 years, 6 months), $t$ (28) = -.465, $p$ = .645.

For those children treated for cancer, the time elapsed since treatment completion, regardless of form, ranged from 1 month to 11 years, 1 month ($M$ = 3 years, 2 months; $SD$ = 2 years, 9 months). Specifically, for the children treated with a combination of chemotherapy and cranial irradiation, the time elapsed since treatment completion ranged from 1 month to 11 years, 1 month whereas time elapsed since treatment for those children receiving only chemotherapy ranged from 1 month to 5 years, 6 months. The time elapsed since treatment was not significantly different between the combined treatment group ($M$ = 4 years, 5 months; $SD$ = 3 years, 9 months) and the

treatment consisting only of chemotherapy ($M$ = 2 years, 3 months; $SD$ = 1 year, 6 months), $t$ (27) = -.298, $p$ = .768.

In addition, the data show that a number of children have been diagnosed with a learning disorder ($N$ = 12). Of these children, eight of the children were in the ALL diagnosed group, whereas four of the children diagnosed with a learning disorder were in the healthy comparison group. As expected, the presence of learning disorders was not different between the two groups as evidenced by chi-square, $\chi^2$= 2.739, $p$ = .098.

Data was also collected regarding the child's current grade level. This frequency data is presented are Table 1. As expected, there was not a significant difference between the grade levels of the cancer and healthy comparison groups, $t$ (58) = -.114, $p$ = .910.

Information regarding the SES of the family and highest grade level of school completed by the parent being interviewed was also collected on the Parental Demographic Questionnaire (Appendix C and D). This frequency data is presented in Table 2 and Table 3, respectively. When analyzed by chi-square, the results show that the cancer group and the healthy comparison group are not significantly different with regard to SES as evidence by a chi-square analysis, $\chi^2$= 3.111, $p$ = .211. However, these two groups are significantly different with regards to educational level, $\chi^2$= 6.480, $p$ = .039.

Materials

Measures of Adaptive Functioning. The Vineland Adaptive Behavior Scales (VABS; Appendix A) assesses the personal and social skills of individuals (Sparrow, Balla, & Cicchetti, 1984). The VABS defines adaptive behavior as the ability of an individual to perform daily activities required for personal and social sufficiency. Adaptive behavior is measured in four domains: Communication, Daily Living Skills,

Socialization, and Motor Skills (ages 5-11 only). An optional domain that is assessed is Maladaptive Behavior. Each domain evaluates various adaptive skills: Communication (receptive, expressive, and written communication skills); Daily Living Skills (personal living habits, domestic task performance, and behavior in community); Socialization (interactions with others, use of free time, and responsibility and sensitivity to others); Motor Skills (gross and fine motor coordination for children under 6 years of age or when deficits are expected); and Maladaptive Behavior (undesirable behaviors that may interfere with adaptive behaviors).

The VABS-Survey Form contains 297 items that are administered in a semi-structured interview format over a 20 to 60 minute period. Items are scored using five categories: 2 = "yes, usually", 1 = "sometimes, partially", 0 = "no, never", N = "no opportunity", and DK = "don't know." Raw scores are converted to standard scores ($M$ = 100, $SD$ = 15) for the four adaptive behavior domains and for the Adaptive Behavior Composite, and percentile rank, as well as age-equivalent scores, are determined. Test-retest reliability coefficients range from .81 to .88 across the five domains. Interrater reliability ranges from .62 to .78. Concurrent validity was established by correlating the Vineland Adaptive Behavior Scales with various tests (ie. Kaufman Assessment Battery for Children, K-ABC, Mental Processing and Achievement Scales). The VABS-Survey Form significantly correlates with the original Vineland.

Measure of Behavioral Functioning. The Child Behavior Checklist (CBCL – Achenbach, 1991; Appendix B) measures internalizing and externalizing problems in children and adolescents. The Child Behavior Checklist, comprised of 120 items in nine scales, is designed for parents of children and adolescents between the ages of 4 to 18

Table 1

Frequency of Children in Each Grade Level by Group

| | Group | | | |
|---|---|---|---|---|
| | | | Cancer | |
| Grade | Healthy | Both Cancer Groups | Combined Treatment | Chemotherapy Only |
| K | 3 | 5 | 0 | 5 |
| 1 | 3 | 1 | 0 | 1 |
| 2 | 4 | 1 | 0 | 1 |
| 3 | 3 | 4 | 2 | 2 |
| 4 | 2 | 4 | 2 | 2 |
| 5 | 3 | 5 | 2 | 3 |
| 6 | 3 | 0 | 0 | 0 |
| 7 | 3 | 4 | 2 | 2 |
| 8 | 1 | 3 | 1 | 2 |
| 9 | 2 | 1 | 1 | 0 |
| 10 | 0 | 0 | 0 | 0 |
| 11 | 1 | 1 | 1 | 0 |
| 12 | 2 | 1 | 1 | 0 |

Table 2

Frequency of Family SES Status by Group

| | Group | | | |
|---|---|---|---|---|
| Income | Healthy | Both Cancer Groups | Cancer Combined Treatment | Chemotherapy Only |
| $5,000-20,000 | 0 | 1 | 0 | 1 |
| $20,000-$40,000 | 4 | 1 | 1 | 0 |
| $40,000-$60,000 | 6 | 12 | 4 | 8 |
| more than $60,000 | 20 | 16 | 7 | 9 |

Table 3

Frequency of Highest Grade Level Completed by Parent as a Function of Group

| | Group | | | |
|---|---|---|---|---|
| Grade Level | Healthy | Both Cancer Groups | Cancer Combined Treatment | Chemotherapy Only |
| High School | 5 | 5 | 2 | 3 |
| Some College | 2 | 6 | 2 | 4 |
| Undergradaute Degree | 6 | 11 | 5 | 6 |
| Master's Degree | 9 | 8 | 3 | 5 |
| Ph.D | 8 | 0 | 0 | 0 |

years old. The following scales are measured with the Parent Rating Scale: Withdrawn, Somatic Complaints, Anxiety/Depression, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, Aggressive Behavior, and Sex Problems. Internalizing, Externalizing, and Total Scores are obtained for each measure. The Internalizing score sums Withdrawn, Somatic Complaints, Anxiety/Depression scales, and the Externalizing score sums the Delinquent Behavior and Aggressive Behavior scales. The CBCL takes approximately 10 to 15 minutes to complete in a semi-structured interview format. Items are scored on a 3-point scale (not true, somewhat true/sometimes true, very true/often true).

Internal reliability ranges from .56 to .92. Test-retest reliability has been found to be between .63 and .97. Interrater reliability coefficients range from .26 to .86. The CBCL is the standard in the field of child psychopathology against which the validity of other instruments is often measured. Nonetheless, Achenbach (1991) provides multiple indices that demonstrate high concurrent correlations with related instruments (e.g., Conners' Parent Rating Scale and the Quay Problem Behavior Checklist) and strong discriminant validity as demonstrated by the ability of the Total Problems and Social Competence scores, alone and in combination, to appropriately classify matched groups of referred and nonreferred youths.

Parental Demographic Questionnaire. The parental demographic questionnaire (Appendix C and D) includes questions regarding the current and diagnostic age of the child, grade level, gender, medical treatment, the amount of time since treatment, and the socioeconomic status of the family.

Parental Assessment of Academic Abilities. The parental assessment of the child's academic abilities (PAAA, Appendix E), which was developed for use in this study, includes a comprehensive list of subjects offered in school. The list of subjects includes: Reading, Math, Science, Social Studies, Writing, English, History, Psychology, Health, Foreign Language, Religion, Art, Music, and Physical Education. For each subject, the parent is asked to assess his/her perception of problems in each subject that the child is taking on a 10-point Likert scale, with 1 indicating "No Difficulty," 5-6 indicating "Moderate Difficulty," and 10 indicating "Severe Difficulty." For each academic subject, the parent also is asked to indicate the average grade received by the child and to characterize the nature of his/her son or daughter's difficulty with the subject area in the comments section.

## Procedure

Parents of children who survived ALL were recruited through CURE - Childhood Cancer Association (Rochester, NY), a support organization for parents whose children have been treated for cancer. A type-written letter describing the nature of the project and contact information for the researcher was given to the agency for mailing (Appendix F). Confidentiality issues prevented the researcher from obtaining addresses and phone numbers directly from the organization. Parents were instructed to contact the researcher by email or telephone if they wished to take part in the study. Once parents have contacted the researcher, the questionnaires were completed over the telephone or in person. In addition, an email message containing the same recruitment information as previously mentioned (Appendix F) was sent to parents who belonged to an ALL-Kids online support group managed by the Association for Cancer Online Resources (ACOR).

The list serve manager for the group was provided with the email message and forwarded the message to all participating members. Parents of the "healthy" matched comparison group were recruited by sending an email message to all faculty and staff of the University of Dayton (Appendix G). Thus, all procedures followed the ethical principles of the American Psychological Association (2002) and data collection did not begin until the study was approved by the Research Review and Ethics Committee, Department of Psychology, University of Dayton.

Informed consent was either received in person (Appendix H and I) or during a telephone conversation (Appendix J and K). Once the researcher obtained informed consent from the parents, a semi-structured interview took place during a 45 to 60 minute session. All parents were given the Parental Demographic Questionnaire, the Parental Assessment of Academic Abilities, the Vineland Adaptive Behavior Scale – Survey Form, and the Child Behavior Checklist. Following the testing session, parents were given a written debriefing form (Appendix L and M) or had the debriefing form read to them over the phone with the option of having the form emailed to them. In addition, parents had an opportunity to ask questions about the study.

# CHAPTER III

# RESULTS

The results are organized into three sections, corresponding with the three general domains examined (adaptive behavior, socioemotional and behavioral problems, and academic difficulties). Within each section, the first subsection presents results from the examination of differences between the cancer group and the healthy comparison group. In the second subsection of each section, results of the follow-up analyses of differences among the cancer chemotherapy group, the cancer chemotherapy/cranial irradiation treatment combination group, and the healthy comparison group are presented. The results presented in this second subsection should be thought of as exploratory in nature, given the limited number of participants in each cancer group and the inability to match the two cancer groups on age.

For all t-tests, which were used to examine overall group differences across the dependent measures, two-tailed results are presented. Given the general directional hypothesis that parents of ALL survivors would report higher levels of impairment for each constructs measured, the use of one-tailed t-tests would appear to be appropriate; nevertheless, to help in controlling for a Type I alpha error, two-tailed tests were used. In addition, the Levene's Test for Equality of Variances was consulted for each analysis and, depending on the result of the analyses, the results of the appropriate t-tests is reported.

## Adaptive Behavior

### Cancer Group Versus Healthy Comparison Group

The results of the t-tests comparing the cancer group and the healthy comparison group with regard to adaptive abilities are summarized in Table 4. There was clear evidence that the adaptive behavioral functioning of the cancer survivors was impaired relative to the healthy comparison group and to the standardization norms. For example, the global index of functioning for the cancer group ($M$ = 87.00, $SD$ = 15.64) was significantly lower than the global index of functioning for the healthy group ($M$ = 101.07, $SD$ = 15.23), $t$ (58) = 3.529, $p$ = .001. The standardization norm for this assessment tool is $M$ = 100, $SD$ = 15. In addition, as detailed in Table 4, impairment was found in all of the specific areas of adaptive functioning: Communication, Daily Living Skills, and Socialization.

### Follow-up Analyses

Follow-up exploratory analyses revealed evidence that both cancer groups were functioning lower than the healthy comparison group and that the treatment combination cancer group was functioning lower than the chemotherapy only cancer group (see Appendix N, O, P). First, when the combined treatment group ($n$ = 12) was compared to the healthy comparison group ($n$ = 30), the combined treatment group had significantly lower scores for the Adaptive Behavior Composite as well as for the Communication and Socialization domains (Appendix N). Second, when the chemotherapy only group ($n$ = 18) was compared to the healthy comparison group ($n$ = 30), the chemotherapy only group had significantly lower scores for the Adaptive Behavior Composite and the Daily Living Skills domain (Appendix O). Third, when the combined treatment group ($n$ = 12)

Table 4

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

| | Comparison Groups | | | | | | |
|---|---|---|---|---|---|---|---|
| Measures by Subject | Healthy | | Cancer | | | | |
| | M | SD | M | SD | t | df | p |
| Adaptive Behavior Composite | 101.07 | 15.23 | 87.00 | 15.64 | 3.529 | 58 | 0.001 |
| *Domains* | | | | | | | |
| Communication | 103.00 | 16.31 | 90.17 | 16.48 | 3.031 | 58 | 0.004 |
| Daily Living Skills | 98.77 | 12.61 | 88.53 | 18.28 | 2.524 | 58 | 0.014 |
| Socialization | 101.30 | 12.26 | 91.97 | 14.95 | 2.635 | 58 | 0.011 |

Note: $N$ = 30 for both the healthy and cancer groups.

was compared to the chemotherapy only group ($n$ = 18), the combined treatment group had significantly lower scores on the Socialization domain (Appendix P).

## Behavior and Socioemotional Problems

### Cancer Group Versus Healthy Comparison Group

The results of the t-tests comparing the cancer group and the healthy comparison group with regard to socioemotional and behavioral problems are summarized in Table 5. The cancer survivors tended to show more socioemotional and behavioral problems relative to the healthy comparison group and to the standardization norms. For instance, the total index of problems for the cancer group ($M$ = 57.33, $SD$ = 7.64) was significantly higher than the total index of problems exhibited by the healthy comparison group ($M$ = 51.67, $SD$ = 9.47), $t$ (55) = -2.469, $p$ = .017. Relative to the healthy comparison group, more problems were reported in the specific areas of Anxious/Depressed, Somatic Complaints, and Internalizing Problems for the cancer group. The groups did not differ in the areas of Withdrawn/Depressed, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behavior, Aggressive Behavior, and Externalizing Problems (Table 5). It is important to note that while some of these results are statistically significant, they do not appear to be clinically significant ($t \geq 60$).

### Follow-up Analyses

Follow-up exploratory analyses revealed evidence that both cancer groups were functioning lower than the healthy comparison group and that the treatment combination cancer group was functioning lower than the chemotherapy only cancer group (Appendix Q, R, S). First, when the combined treatment group ($n$ = 12) was compared to the healthy comparison group ($n$ = 30), the combined treatment group had significantly higher scores

Table 5

Mean Standard Scores on Behavior Problems as a Function of Group

| Measures by Subject | Comparison Groups: Healthy M | Healthy SD | Cancer M | Cancer SD | t | df | p |
|---|---|---|---|---|---|---|---|
| Total Problems | 51.67 | 9.47 | 57.33 | 7.64 | -2.47 | 55 | 0.017 |
| Internalizing Problems | 51.10 | 9.64 | 60.85 | 9.60 | -3.82 | 55 | 0.000 |
| *Internalizing Problem Domains* | | | | | | | |
| Anxious/Depressed | 55.17 | 6.55 | 59.89 | 8.33 | -2.39 | 55 | 0.020 |
| Withdrawn/Depressed | 55.03 | 6.11 | 58.33 | 8.63 | -1.68 | 55 | 0.099 |
| Somatic Complaints | 53.57 | 4.87 | 61.30 | 9.13 | -4.05 | 55 | 0.000 |
| Externalizing Problems | 51.27 | 9.27 | 52.33 | 7.39 | -0.48 | 55 | 0.635 |
| *Externalizing Problems Domains* | | | | | | | |
| Rule-Breaking Behavior | 54.07 | 4.90 | 53.07 | 3.53 | 0.87 | 55 | 0.389 |
| Aggressive Behavior | 54.73 | 5.45 | 55.19 | 5.75 | -0.31 | 55 | 0.762 |
| *Other Problems* | | | | | | | |
| Social Problems | 54.47 | 5.58 | 57.52 | 6.53 | -1.90 | 55 | 0.062 |
| Thought Problems | 56.77 | 5.97 | 58.11 | 5.47 | -0.88 | 55 | 0.381 |
| Attention Problems | 55.07 | 7.11 | 57.67 | 7.94 | -1.31 | 55 | 0.197 |

for the Total Problems index as well as for the areas of Internalizing Problems, Anxious/Depressed, and Thought Problems (Appendix Q). Second, when the chemotherapy only group ($n$ = 18) was compared to the healthy comparison group ($n$ = 30), the chemotherapy only group had significantly higher scores for the areas of Internalizing Problems as well as Somatic Complaints (Appendix R). Third, when the combined treatment group ($n$ = 12) was compared to the chemotherapy only group ($n$ = 18), the combined treatment group had significantly higher scores on the area of Thought Problems (Appendix S).

## Academic Difficulty

### Cancer Group Versus Healthy Comparison Group

The results of the t-tests comparing the cancer group and the healthy comparison group with regard to scholastic difficulty are summarized in Table 6. The level of difficulty experienced by cancer survivors was higher relative to the healthy comparison group in the following academic subjects: Reading, Writing, and Social Studies. It should be noted that each comparison involved groups with unequal participants due to the fact that the academic subjects assessed by the parents was dependent on the child's grade level and the appropriate subjects taught at each grade level. In other words, children who are in high school would be enrolled in different academic subjects than those children enrolled in elementary school.

### Follow-up Analyses

Follow-up exploratory analyses revealed evidence that both cancer groups were functioning lower than the healthy comparison group and that the combined treatment

Table 6

Mean Standard Scores on a Measure of Academic Achievement as a Function of Group

| Measures by Subject | Comparison Groups: Healthy N | Healthy M | Healthy SD | Cancer N | Cancer M | Cancer SD | t | df | p |
|---|---|---|---|---|---|---|---|---|---|
| Science Scale | 24 | 2.08 | 1.32 | 21 | 2.76 | 2.02 | -1.35 | 43 | 0.184 |
| Math Scale | 26 | 2.65 | 1.96 | 22 | 3.86 | 2.34 | -1.95 | 46 | 0.057 |
| Reading Scale | 14 | 1.85 | 1.51 | 17 | 4.47 | 3.24 | -2.96 | 24 | 0.007 |
| Writing Scale | 13 | 2.38 | 2.29 | 17 | 5.29 | 3.35 | -2.82 | 28 | 0.009 |
| English Scale | 15 | 1.67 | 1.11 | 6 | 4.17 | 3.31 | -1.81 | 5.5 | 0.125 |
| Social Studies Scale | 20 | 2.00 | 1.30 | 18 | 3.72 | 2.97 | -2.28 | 23 | 0.033 |
| History Scale | 8 | 1.50 | 0.76 | 2 | 1.00 | 0.00 | 1.87 | 7 | 0.104 |
| Foreign Language Scale | 9 | 2.67 | 1.94 | 4 | 2.25 | 1.50 | 0.38 | 11 | 0.712 |
| Art Scale | 20 | 1.45 | 1.36 | 19 | 2.32 | 2.03 | -1.56 | 31 | 0.129 |
| Music Scale | 19 | 1.47 | 1.84 | 18 | 1.78 | 1.31 | -0.58 | 35 | 0.568 |
| Physical Education | 22 | 1.27 | 1.08 | 18 | 2.00 | 1.82 | -1.50 | 26 | 0.146 |

group was functioning lower than the chemotherapy only cancer group (Appendix T, U, V). First, when the combined treatment group was compared to the healthy comparison group, parents of the children in the combined treatment group reported significantly more problems within the subjects of Math, Reading, and Writing (Appendix T). However, when the chemotherapy only group was compared to the healthy comparison group, parents reported no differences in difficulty levels on any academic subjects (Appendix U). Still, when the combined treatment group was compared to the chemotherapy only group, the parents of the children who received combined treatment reported more problems in several subjects, including Writing, Foreign Language, and Music (Appendix V).

Examination of Qualitative Data Regarding Academic Performance

In addition to the quantitative data reported in Table 6, qualitative comments collected in the Parental Assessment of Academic Abilities were also examined. When academic problems were reported, a number of themes emerged from the array of comments provided. The most common themes identified throughout the academic subjects were as follows: attention/memory difficulties and the inability to remember/learn principles or rules, the difficulty to decipher and organize what is being read to form a coherent thought, the cognitive difficulty in integrating thoughts into a repeatable story, and severe difficulties with the physical task of writing (fine-motor skills). Below, each theme is illustrated by samples of qualitative data selected.

With regards to the attention/memory concerns, parents identified the most problems within the subjects of math, social studies/history, and science. Even if the child was interested in the subject, the grades achieved within the class were poor because of

the child's inability to transfer information from short term into long term memory. As a result, the academic subjects that rely mostly on memorization to learn the material proved to be very difficult for many of the children. For example, one parent noted that her 14 year old daughter "still doesn't know multiplication or division" because the rules involved cannot be retained in long term memory. In addition, the children have difficulty retaining the directions given to complete an assignment. As one parent noted of her 10 year old son, "While he may have the intelligence to complete the task, he isn't able to pay attention long enough and to remember the directions given to him by his teacher."

As stated earlier, parents of children who survived ALL also identified a difficulty with the child's ability to read. For example, one parent stated that her 12 year old son tended to "see words in a jumbled order." While the child possesses the skills to read, the child's inability to organize what is being read leads to a problem understanding the message of the written passage. In addition, another parent noted that her 15 year old son "loses track" of what he is reading. As a result, the child is unable to gain a sense of what is being read. Furthermore, one parent reported that her 13 year old daughter "missed words" when reading a story, making it difficult to comprehend the meaning of written material. Oftentimes, the child may be aware of such a problem with comprehension and may want to help oneself learn and understand the material. However, with such a dysfunctional way of processing the information, the child is continuously likely to become lost in the minor details of the story and unable to identify the main points.

Some children seem to have a great deal of difficulty making the connections between different components of a story, thus becoming bogged down in the minor

details rather than forming an entire picture for the reader. As one parent noted of her 14 year old daughter, "[She]has the most difficulty integrating verbal information with nonverbal information." Specifically, the child in this example has a difficult time communicating experiences that she has witnessed. While she is aware of what she would like to say, she can not find the words to adequately express herself. Similarly, one parent noted that her 11 year old son has a great deal of difficulty "connecting his brain to the appropriate expression." That is, while he may be aware of the message that he wants to convey, he has a difficult time identifying and retrieving the words that express his thoughts. In essence, while a child is able to develop thoughts and opinions, the child may have difficulty with the ability of expressing oneself, either verbally or in writing.

In addition, many parents of childhood survivors of ALL have noticed difficulty with the actual holding/gripping a pencil and the formation of letters, apparently the result of major weaknesses with some of these children's fine motor abilities. As one parent noted of her 8 year old son, "his handwriting is very messy, almost illegible after prolonged period of writing." In addition, some of the children seem to lack the fine motor abilities needed to write in cursive. As a mother states of her 10 year old daughter, "she doesn't know how to form certain letters when she writes in cursive." Furthermore, one mother stated that her 16 year old son now has a permanent hand tremor that makes writing difficult and illegible.

To summarize, the performance of the cancer survivors on specific measures of adaptive functioning and academic abilities were significantly lower on most domains assessed. In addition, problematic behavioral and socioemotional functioning was more prevalent with the cancer survivors as compared to the "healthy" children.

# CHAPTER IV

# DISCUSSION

The results of this study are consistent with previous studies (Brown, Sawyer, Antoniou, Toogood, & Rice, 1999; Brown, et al., 1998; Copeland, et al., 1985; Regan & Reeb, 1998; Rowland, et al., 1984). These results suggest that long-term survivors of ALL, who are diagnosed and treated with chemotherapy, either alone or in combination with cranial irradiation, show deficits in adaptive abilities and academic functioning, and exhibit higher incidences of problematic behavioral and emotional functioning. For each of the domains examined, this section will compare the results of this study with past research findings, and specific recommendations for future research relative to each domain will be considered. In addition, the limitations of this study and general recommendations for future research studies will be addressed.

## Domains Examined in the Study

### Adaptive Behavior Functioning

The results of this study support the hypothesis that children who have been treated for cancer will have a difficult time adjusting to factors pertaining to normal living, including communication skills, socialization skills, and daily living skills. While the focal point of past research has never focused on these specific tenets of adaptive behavior, many other studies have concluded that the cancer experience and cancer treatments impair a child's ability to become acclimated to life (Haase & Rostad, 1994;

Mulhern, Wasserman, Friedman, & Fairclough, 1989; Noll, Bukowski, Rogosch, LeRoy, & Kulkarni, 1990).

While other research in the field of ALL has focused on general adjustment after cancer treatment, a study completed by Kramer, Crittenden, DeSantes, and Cowan (1997) used the Vineland Adaptive Behavioral Scales to assess adaptive behavior after children received a bone-marrow transplant. The participants of this study were diagnosed with a variety of cancers, such as brain tumors and neuroblastoma. The results of this study found a significant drop in the overall composite score between baseline and 1-year follow-up. In addition, an examination of the specific domains of communication, socialization, and daily living skills also showed a significant decline from initial baseline measurements. Therefore, as found in the current study, children who are diagnosed with cancer and undergo cancer treatments are more likely to exhibit problems with adaptation to normal life once the entire cancer experience, including regular cancer treatments, have ceased. It appears as though the entire cancer experience – diagnosis, change in lifestyle, painful medical treatments, missed school, physiological effects of treatment, coping with possibility of death – lends itself virtually impossible to differentiate the effect that *each* component has on a child's future adjustment abilities. Future research should focus on identifying which components of the cancer experience have the most impact on the future adaptive abilities of a cancer survivor. This would require a large-scale prospective longitudinal study.

Behavioral and Emotional Functioning

The results of this study supported the initial hypothesis that children who have been treated for ALL would exhibit more problems with behavioral and emotional

functioning. Specifically, children exhibited impairment in the following specific areas of behaviors: Anxious/Depressed, Somatic Complaints, and Internalizing Problems. As discussed below, the results of this study are consistent with findings of previous research.

As initially discussed by Koocher, O'Malley, Gogan, and Foster (1980) a number of psychosocial sequelae are common among children who have been diagnosed and treated for cancer. The most prevalent residual sequelae of the cancer treatments included depression, anxiety, and poor self-esteem. Furthermore, the results of Koocher, O'Malley, Gogan, and Foster (1980) indicated that those children who had the most difficulty with psychosocial adjustment would be less able to adequately socialize and to engage self-help skills as compared to others who were classified as having "good adjustment."

As studies have suggested (Butler, Rizzi, & Bandilla, 1999; Greenburg, Kazak, Meadows, 1989; Sawyer, Antoniou, Toogood, & Rice, 1997), symptoms associated with depression and anxiety are often experienced by children who have undergone the cancer experience. Therefore, a clear clinical recommendation that can be made is that all survivors of cancer should be monitored for such symptomology.

However, the identification of those factors that make a child most likely to develop such symptomology is a recommended direction for future research. Frank, Blount, and Brown (1997) underscored the importance of assessing depressive attributional style and avoidance coping in examining risk for developing emotional and behavioral difficulties associated with the cancer experience. In past research, depressive attributional style has consistently been examined in psychopathology literature and has

been identified as an important predictor of depression in children (Schoenherr, Brown, Baldwin, & Kaslow, 1992). In addition, a child's use of avoidance coping strategies appears to be related to internalizing problems (Schoenherr, Brown, Baldwin, & Kaslow, 1992). Further research is needed to determine the extent to which depressive attributional style and avoidance coping mediate the development of depression and anxiety in ALL survivors.

In addition, as discussed by Noll et al., (1997), parents also reported that children who are cancer survivors tend to experience more somatic concerns when compared to healthy children. As found in Noll et al., (1997), children who have been treated for cancer tend to experience more stomach aches, headaches, and general aches and pains. While it is not possible to differentiate whether these somatic problems are a result of physical ailments or of a psychosomatic nature, it is important to acknowledge that cancer survivors are more likely to report higher levels of somatic concerns.

Academic Functioning

The results of this study indicate that children who have been treated for cancer exhibit more difficulty in reading, writing, and social studies. In addition, several themes regarding difficulties in the classroom emerged from the qualitative data collected, including: attention/memory difficulty and the inability to remember/learn principles or rules, difficulty deciphering and organizing what is being read to form a coherent thought, the cognitive difficulty of integrating thoughts into a tell-able story, as well as severe difficulty with the physical task of having to write (fine-motor skills). These results are consistent with findings of previous research. As discussed by Taylor, et al. (1987), survivors of ALL showed deficits in planning ability, novel learning and problem

solving, mental efficiency, and the ability to follow multiple-element commands. In addition, their study found that children took longer to complete tasks, had difficulty in tasks requiring appreciation of new concepts or the following of multi-element directions, and learned less rapidly than the comparison group.

In a literature review completed by Vance and Eiser (2002), it was found that while children who were being treated for cancer missed more school due to their medical treatments, these children were more willing to go to school when they were physically able. In addition, the children treated for cancer exhibited behavior that was within normal ranges. However, this literature review found that children with cancer differ from healthy children in key areas of social functioning, and have restricted leadership and social skills. Given these challenges of becoming reintegrated into the classroom, along with the academic difficulties that may ensue as a result of the medical treatment, a clinical recommendation can be made that schools provide intervention programs to help the child become acclimated with peers, teachers, as well as the demands placed on them by the school work.

As reviewed by Reeb and Regan (1998), research has shown that children who underwent cancer treatment for ALL exhibited several problems with memory as well as fine motor skills. Qualitative data (parents' comments) of their study included a parental report of a child treated for ALL who exhibited impairment in tasks demanding for processing speed and memory. In addition, qualitative data of this thesis also identified deficits when the child needed to use both input (visual organization) and output (fine motor coordination) processes. Similarly, Copeland et al. (1985) found that children who had been treated for cancer exhibited significantly lower scores on tests assessing visual-

motor integration, arithmetic, coding, spatial memory, and fine motor skills. The academic difficulties identified within the current study are possibly directly related to these neurocognitive deficits. The cancer treatments appear to have impaired the child's ability to adequately process the information presented, retain the information for future retrieval, and to encode the information within the mind in a manner that is conducive for learning and understanding. In addition, the fine motor skills of the children appear to have been impacted by the cancer treatments, in some cases leading to problems with hand writing abilities. In research and clinical work, there needs to be a greater emphasis on how best to "re-integrate" ALL survivors into the school system, help them address (or compensate for) cognitive impairments, and provide resources and support as they face academic challenges.

## Limitations of Present Study and Research Recommendations

While the present study addressed several issues that have not been dealt with in previous research, some methodological limitations may be of importance in the interpretation of the findings. First, the number of parents of ALL survivors was limited. A larger sample size would have allowed for more meaningful comparisons across different cancer groups (ie. chemotherapy only versus combined treatment of chemotherapy and cranial irradiation). The privacy laws enacted after the commencement of this research study severely impacted the manner in which families of ALL survivors can be identified and contacted. Therefore, the number of responses indicating an interest to take part in the study were small.

Second, the parents who were interviewed in this study may be more knowledgeable and active within the ALL support community. Those who responded to

the request for volunteers in this study were either members of an online support group or of a local support group in Rochester, NY. Given the optional nature of becoming a part of these organizations, the parents who were contacted were not from a random sample of parents whose children have survived ALL. Third, as an extension of difficulties recruiting participants, children across the two groups were not perfectly matched on age and SES. Fourth, the format of this study did not allow for interaction with the children to provide them with an opportunity to evaluate their own sense of current functioning or to directly test them with neuropsychological, academic, and adaptation measures.

In light of these limitations, future research should primarily focus on developing a multi-site study – one which would clearly address sample size and resource issues. Armstrong (1995) identifies several reasons for taking such an approach. A major methodological limitation of a majority of studies within this area includes the use of a small heterogeneous samples (Regan and Reeb, 1998). This limitation makes it difficult to differentiate the difficulties experienced by the subgroups – those receiving only chemotherapy and those receiving a combination of chemotherapy and cranial irradiation. As discussed by Brown et al. (1999), a longitudinal investigation identified that children treated with chemotherapy only also exhibited a deterioration in academic and cognitive functioning when compared to a age appropriate norms for each of the assessment instrument used. Therefore, while it was once believed that chemotherapy use did not produce the same deficits as cranial irradiation, the results of this study indicate that such conclusions may be premature. In fact, chemotherapy *does* appear to impact a child's ability to adequately function in the future. A failure to adequately pinpoint potential

outcomes in these two subgroups may prevent the development of appropriate preventative and rehabilitation services for these children (Armstrong, 1995).

Nevertheless, this study did provide some information regarding this issue. In brief, the exploratory follow-up analyses of the present study suggested that: (a) the combined treatment groups had greater impairments than the chemotherapy only group; and (b) the chemotherapy only group had greater impairments than the healthy comparison group.

As discussed by Armstrong (1995), the use of a "multiple investigator/center collaboration" approach (p. 419) is effective in recruiting a large number of participants in this field of study. Established cancer groups, such as the Pediatric Oncology Group (POG) and the Children's Cancer Group (CCG), have specialized committees that are designed to address specific concerns that might arise as a result of cancer treatment. In addition, these groups serve as central resources for parents, physicians, nurses, psychologists, and other health professionals, and thus have access to a large homogeneous sample. Through the use of such organizations, a larger sample size would allow for the assessment of children who have been treated for cancer and should focus future attention on the adaptation problems that childhood cancer survivors are likely to experience.

In addition, it is important for future studies to assess the effects of the cancer treatments from the total cancer experience. In most studies completed in this field, it is virtually impossible to determine how chemotherapy and/or cranial irradiation have solely impacted the child's future ability to function. Rather, the studies are only able to

measure how the entire cancer experience, from diagnosis to survivor status, has affected the individual. A large-scale prospective longitudinal study is needed.

## Conclusion

For years, the most typical form of treatment for children with ALL included cranial irradiation therapy combined with different forms of chemotherapy. As research continued in the pediatric oncology field, it was found that cranial irradiation adversely affects many factors in the life of a child. To prevent such severe effects of treatment, cranial irradiation has been used much less often and current treatment involves a combination of several chemotherapy regimens.

The symptoms that have been linked with survivorship include, but are not limited to, learning problems, cognitive problems, and social disabilities. The purpose of this study was to identify problems with adjustment in daily living as a result of being treated for cancer with either the sole use of chemotherapy or the combined treatment of chemotherapy with cranial irradiation. There were three specific domains assessed within this study: adaptive functioning, behavioral and socioemotional functioning, and academic functioning. This study found that children who have been treated for cancer show deficits in adaptive abilities, emotional and behavioral functioning, as well as academic functioning. Future research should focus on obtaining larger sample sizes allowing for comparisons between children who have been treated for cancer with chemotherapy only to those children treated with a combination of chemotherapy and cranial irradiation. In addition, future research should look at identifying the direct effects that cancer treatment has on the child in addition to assessing the impact of the entire cancer experience on the child's ability to function in the future.

# APPENDIX A

## Vineland Adaptive Behavior Scales

# VINELAND

## ADAPTIVE BEHAVIOR SCALES

Sara S. Sparrow, David A. Balla, and Domenic V. Cicchetti
A revision of the *Vineland Social Maturity Scale* by Edgar A. Doll

## INTERVIEW EDITION
## Survey Form
### Record Booklet

**ABOUT THE INDIVIDUAL:**

Name _____ Sex _____

Home address _____

Telephone (____) _____ Grade _____

School or other facility _____

Present classification or diagnosis _____

Race (if pertinent) _____

Socioeconomic background (if pertinent) _____

Other pertinent information _____

_____

| AGE: | YEAR | MONTH | DAY |
|---|---|---|---|
| Interview date | | | |
| Birth date | | | |
| Chronological age | | | |

Age used for starting points _____

Type (circle one): chronological mental social

**ABOUT THE RESPONDENT:**

Name _____ Sex _____

Relationship to individual _____

**ABOUT THE INTERVIEWER:**

Name _____ Sex _____

Position _____

**DATA FROM OTHER TESTS:**

Intelligence _____

_____

Achievement _____

_____

Adaptive behavior _____

_____

Other _____

_____

_____

**REASON FOR THE INTERVIEW:** _____

_____

_____

**BEFORE BEGINNING ADMINISTRATION, READ THE INSTRUCTIONS IN THE MANUAL CAREFULLY.**

**General Directions:** In each adaptive behavior domain, begin scoring with the item designated for the individual's age. Score each item 2, 1, 0, N, or DK, according to the scoring criteria in the manual (Appendix C). Record each score in this booklet in the designated box. Establish a *basal* of *seven* consecutive items scored *2* and a *ceiling* of *seven* consecutive items scored *0* for each domain. (For reference when totaling scores, the highest possible sums are printed in the upper right corner of the sum boxes.)

COMMUNICATION DOMAIN

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

| | | RECEPTIVE | EXPRESSIVE | WRITTEN |
|---|---|---|---|---|
| <1 | 1. Turns eyes and head toward sound. | ☐ | | |
| | 2. Listens at least momentarily when spoken to by caregiver. | ☐ | | |
| | 3. Smiles in response to presence of caregiver. | | ☐ | |
| | 4. Smiles in response to presence of familiar person other than caregiver. | | ☐ | |
| | 5. Raises arms when caregiver says, "Come here" or "Up." | ☐ | | |
| | 6. Demonstrates understanding of the meaning of "no." | ☐ | | |
| | 7. Imitates sounds of adults immediately after hearing them. | | ☐ | |
| | 8. Demonstrates understanding of the meaning of at least 10 words. | ☐ | | |
| 1 | 9. Gestures appropriately to indicate "yes," "no," and "I want." | | ☐ | |
| | 10. Listens attentively to instructions. | ☐ | | |
| | 11. Demonstrates understanding of the meaning of "yes" or "okay." | ☐ | | |
| | 12. Follows instructions requiring an action and an object. | ☐ | | |
| | 13. Points accurately to at least one major body part when asked. | ☐ | | |
| | 14. Uses first names or nicknames of siblings, friends, or peers, or states their names when asked. | | ☐ | |
| | 15. Uses phrases containing a noun and a verb, or two nouns. | | ☐ | |
| | 16. Names at least 20 familiar objects without being asked. DO NOT SCORE 1. | | ☐ | |
| | 17. Listens to a story for at least five minutes. | ☐ | | |
| | 18. Indicates preference when offered a choice. | | ☐ | |
| 2 | 19. Says at least 50 recognizable words. DO NOT SCORE 1. | | ☐ | |
| | 20. Spontaneously relates experiences in simple terms. | | ☐ | |
| | 21. Delivers a simple message. | | ☐ | |
| | 22. Uses sentences of four or more words. | | ☐ | |
| | 23. Points accurately to all body parts when asked. DO NOT SCORE 1. | ☐ | | |
| | 24. Says at least 100 recognizable words. DO NOT SCORE 1. | | ☐ | |
| | 25. Speaks in full sentences. | | ☐ | |
| | 26. Uses "a" and "the" in phrases or sentences. | | ☐ | |
| | 27. Follows instructions in "if-then" form. | ☐ | | |
| | 28. States own first and last name when asked. | | ☐ | |
| | 29. Asks questions beginning with "what," "where," "who," "why," and "when." DO NOT SCORE 1. | | ☐ | |
| 3, 4 | 30. States which of two objects not present is bigger. | | ☐ | |
| | 31. Relates experiences in detail when asked. | | ☐ | |
| | 32. Uses either "behind" or "between" as a preposition in a phrase. | | ☐ | |
| | 33. Uses "around" as a preposition in a phrase. | | ☐ | |
| | | 24 | 42 | 0 |

COMMENTS

Count items before basal as 2, items after ceiling as 0.

Sum of 2s, 1s, 0s page 2

COMMENTS

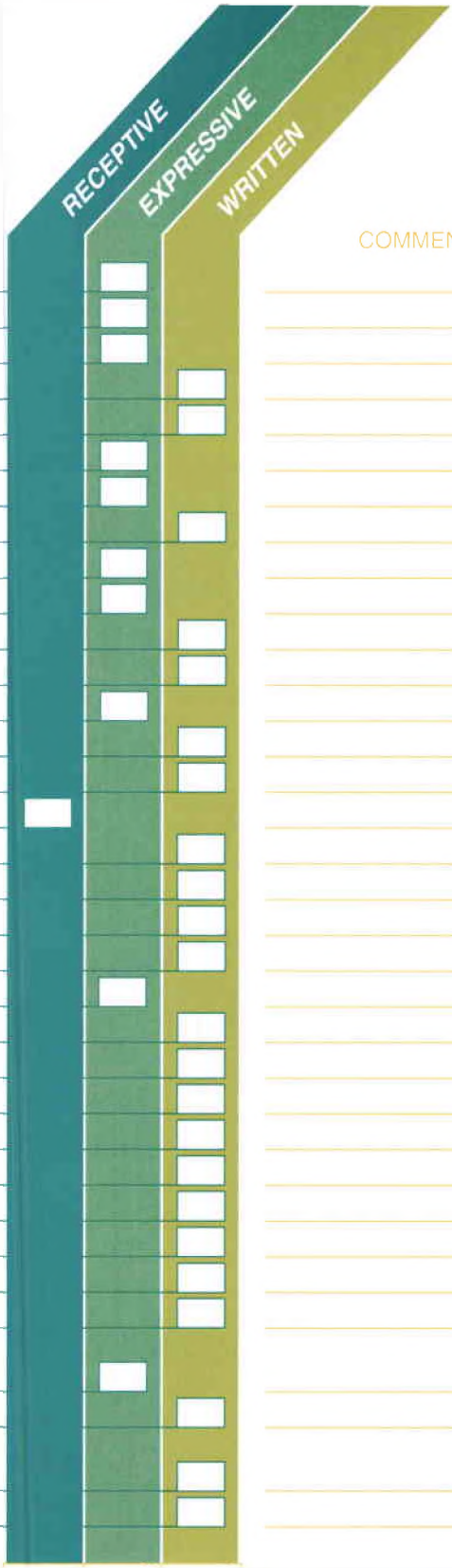
RECEPTIVE

EXPRESSIVE

WRITTEN

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know




COMMENTS

34. Uses phrases or sentences containing "but" and "or."
35. Articulates clearly, without sound substitutions.
36. Tells popular story, fairy tale, lengthy joke, or television show plot.
37. Recites all letters of the alphabet from memory.
38. Reads at least three common signs.
39. States month and day of birthday when asked.
40. Uses irregular plurals.
41. Prints or writes own first and last name.
42. States telephone number when asked. N MAY BE SCORED.
43. States complete home address, including city and state, when asked.
44. Reads at least 10 words silently or aloud.
45. Prints or writes at least 10 words from memory.
46. Expresses ideas in more than one way, without assistance.
47. Reads simple stories aloud.
48. Prints or writes simple sentences of three or four words.
49. Attends to school or public lecture more than 15 minutes.
50. Reads on own initiative.
51. Reads books of at least second-grade level.
52. Arranges items or words alphabetically by first letter.
53. Prints or writes short notes or messages.
54 Gives complex directions to others.
55. Writes beginning letters. DO NOT SCORE 1.
56. Reads books of at least fourth-grade level.
57. Writes in cursive most of the time. DO NOT SCORE 1.
58. Uses a dictionary.
59. Uses the table of contents in reading materials.
60. Writes reports or compositions. DO NOT SCORE 1.
61. Addresses envelopes completely.
62. Uses the index in reading materials.
63. Reads adult newspaper stories. N MAY BE SCORED.
64. Has realistic long-range goals and describes in detail plans to achieve them.
65. Writes advanced letters.
66. Reads adult newspaper or magazine stories each week. N MAY BE SCORED.
67. Writes business letters. DO NOT SCORE 1.

Count items before basal as 2, items after ceiling as 0.

| | RECEPTIVE | EXPRESSIVE | WRITTEN | |
|---|---|---|---|---|
| 1. | 2 | 20 | 46 | Sum of 2s, 1s, 0s page **3** |
| 2. | | | | Sum of 2s, 1s, 0s page **2** |
| 3. | | | | Number of Ns pages **2** and **3** |
| 4. | | | | Number of DKs pages **2** and **3** |
| | 26 | 62 | 46 | **SUBDOMAIN RAW SCORE** (Add rows 1–4 above) |

COMMENTS

RECEPTIVE

EXPRESSIVE

WRITTEN

COMMUNICATION DOMAIN

# DAILY LIVING SKILLS DOMAIN

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

| | | PERSONAL | DOMESTIC | COMMUNITY |
|---|---|---|---|---|
| <1 | 1. Indicates anticipation of feeding on seeing bottle, breast, or food. | | | |
| | 2. Opens mouth when spoon with food is presented. | | | |
| | 3. Removes food from spoon with mouth. | | | |
| | 4. Sucks or chews on crackers. | | | |
| | 5. Eats solid food. | | | |
| 1 | 6. Drinks from cup or glass unassisted. | | | |
| | 7. Feeds self with spoon. | | | |
| | 8. Demonstrates understanding that hot things are dangerous. | | | |
| | 9. Indicates wet or soiled pants or diaper by pointing, vocalizing, or pulling at diaper. | | | |
| | 10. Sucks from straw. | | | |
| | 11. Willingly allows caregiver to wipe nose. | | | |
| | 12. Feeds self with fork. | | | |
| | 13. Removes front-opening coat, sweater, or shirt without assistance. | | | |
| 2 | 14. Feeds self with spoon without spilling. | | | |
| | 15. Demonstrates interest in changing clothes when very wet or muddy. | | | |
| | 16. Urinates in toilet or potty-chair. | | | |
| | 17. Bathes self with assistance. | | | |
| | 18. Defecates in toilet or potty-chair. | | | |
| | 19. Asks to use toilet. | | | |
| | 20. Puts on "pull-up" garments with elastic waistbands. | | | |
| | 21. Demonstrates understanding of the function of money. | | | |
| | 22. Puts possessions away when asked. | | | |
| 3 | 23. Is toilet-trained during the night. | | | |
| | 24. Gets drink of water from tap unassisted. | | | |
| | 25. Brushes teeth without assistance. DO NOT SCORE 1. | | | |
| | 26. Demonstrates understanding of the function of a clock, either standard or digital. | | | |
| | 27. Helps with extra chores when asked. | | | |
| | 28. Washes and dries face without assistance. | | | |
| | 29. Puts shoes on correct feet without assistance. | | | |
| | 30. Answers the telephone appropriately. N MAY BE SCORED. | | | |
| | 31. Dresses self completely, except for tying shoelaces. | | | |
| 4 | 32. Summons to the telephone the person receiving a call, or indicates that the person is not available. N MAY BE SCORED. | | | |
| | 33. Sets table with assistance. | | | |
| | | 50 | 6 | 10 |

COMMENTS

Count items before basal as 2, items after ceiling as 0.

Sum of 2s, 1s, 0s page 4

COMMENTS

PERSONAL

DOMESTIC

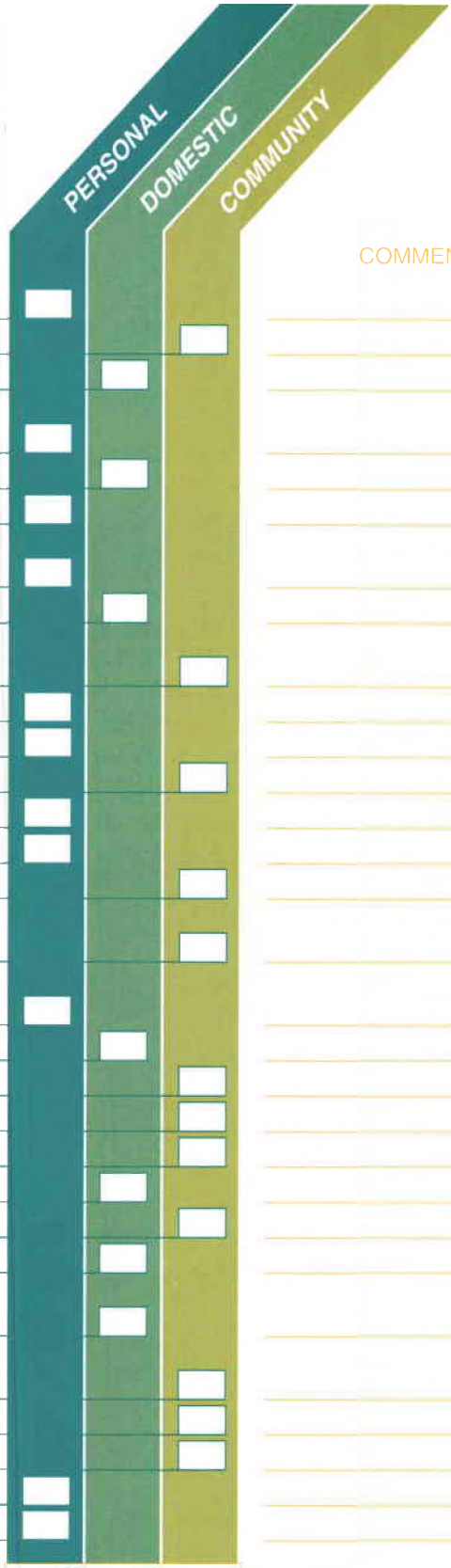
COMMUNITY

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

COMMENTS

34. Cares for all toileting needs, without being reminded and without assistance. DO NOT SCORE 1.
35. Looks both ways before crossing street or road.
36. Puts clean clothes away without assistance when asked.
37. Cares for nose without assistance. DO NOT SCORE 1.
38. Clears table of breakable items.
39. Dries self with towel without assistance.
40. Fastens all fasteners. DO NOT SCORE 1.
41. Assists in food preparation requiring mixing and cooking.
42. Demonstrates understanding that it is unsafe to accept rides, food, or money from strangers.
43. Ties shoelaces into a bow without assistance.
44. Bathes or showers without assistance. DO NOT SCORE 1.
45. Looks both ways and crosses street or road alone.
46. Covers mouth and nose when coughing and sneezing.
47. Uses spoon, fork, and knife competently. DO NOT SCORE 1.
48. Initiates telephone calls to others. N MAY BE SCORED.
49. Obeys traffic lights and Walk and Don't Walk signs. N MAY BE SCORED.
50. Dresses self completely, including tying shoelaces and fastening all fasteners. DO NOT SCORE 1.
51. Makes own bed when asked.
52. States current day of the week when asked.
53. Fastens seat belt in automobile independently. N MAY BE SCORED.
54. States value of penny, nickel, dime, and quarter.
55. Uses basic tools.
56. Identifies left and right on others.
57. Sets table without assistance when asked.
58. Sweeps, mops, or vacuums floor carefully, without assistance, when asked.
59. Uses emergency telephone number in emergency. N MAY BE SCORED.
60. Orders own complete meal in restaurant. N MAY BE SCORED.
61. States current date when asked.
62. Dresses in anticipation of changes in weather without being reminded.
63. Avoids persons with contagious illnesses, without being reminded.




Count items before basal as 2, items after ceiling as 0.

Sum of 2s, 1s, 0s page **5**

COMMENTS


DAILY LIVING SKILLS DOMAIN

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

PERSONAL | DOMESTIC | COMMUNITY

COMMENTS

| | | | | |
|---|---|---|---|---|
| 9, 10 | 64. | Tells time by five-minute segments. | | | ☐ |
| | 65. | Cares for hair without being reminded and without assistance. DO NOT SCORE 1. | ☐ | | |
| | 66. | Uses stove or microwave oven for cooking. | | ☐ | |
| | 67. | Uses household cleaning products appropriately and correctly. | | ☐ | |
| 11, 12 | 68. | Correctly counts change from a purchase costing more than a dollar. | | | ☐ |
| | 69. | Uses the telephone for all kinds of calls, without assistance. N MAY BE SCORED. | | | ☐ |
| | 70. | Cares for own fingernails without being reminded and without assistance. DO NOT SCORE 1. | ☐ | | |
| | 71. | Prepares foods that require mixing and cooking, without assistance. | | ☐ | |
| 13, 14, 15 | 72. | Uses a pay telephone. N MAY BE SCORED. | | | ☐ |
| | 73. | Straightens own room without being reminded. | | ☐ | |
| | 74. | Saves for and has purchased at least one major recreational item. | | | ☐ |
| | 75. | Looks after own health. | ☐ | | |
| 16 | 76. | Earns spending money on a regular basis. | | | ☐ |
| | 77. | Makes own bed and changes bedding routinely. DO NOT SCORE 1. | | ☐ | |
| | 78. | Cleans room other than own regularly, without being asked. | | ☐ | |
| | 79. | Performs routine household repairs and maintenance tasks without being asked. | | ☐ | |
| 17 to 18+ | 80. | Sews buttons, snaps, or hooks on clothes when asked. | | ☐ | |
| | 81. | Budgets for weekly expenses. | | | ☐ |
| | 82. | Manages own money without assistance. | | | ☐ |
| | 83. | Plans and prepares main meal of the day without assistance. | | ☐ | |
| | 84. | Arrives at work on time. | | | ☐ |
| | 85. | Takes complete care of own clothes without being reminded. DO NOT SCORE 1. | | ☐ | |
| | 86. | Notifies supervisor if arrival at work will be delayed. | | | ☐ |
| | 87. | Notifies supervisor when absent because of illness. | | | ☐ |
| | 88. | Budgets for monthly expenses. | | | ☐ |
| | 89. | Sews own hems or makes other alterations without being asked and without assistance. | | ☐ | |
| | 90. | Obeys time limits for coffee breaks and lunch at work. | | | ☐ |
| | 91. | Holds full-time job responsibly. DO NOT SCORE 1. | | | ☐ |
| | 92. | Has checking account and uses it responsibly. | | | ☐ |

Count items before basal as 2, items after ceiling as 0.

| | | | |
|---|---|---|---|
| | 6 | 22 | 30 |
| 1. | | | Sum of 2s, 1s, 0s page **6** |
| 2. | | | Sum of 2s, 1s, 0s page **5** |
| 3. | | | Sum of 2s, 1s, 0s page **4** |
| 4. | | | Number of Ns pages **4, 5, 6** |
| 5. | | | Number of DKs pages **4, 5, 6** |
| | 78 | 42 | 64 |

**SUBDOMAIN RAW SCORE**
(Add rows 1–5 above)

COMMENTS

PERSONAL
DOMESTIC
COMMUNITY

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

INTERPERSONAL RELATIONSHIPS | PLAY & LEISURE TIME | COPING SKILLS

COMMENTS

| | | | |
|---|---|---|---|
| 1. | Looks at face of caregiver. | ☐ | |
| 2. | Responds to voice of caregiver or another person. | ☐ | |
| 3. | Distinguishes caregiver from others. | ☐ | |
| 4. | Shows interest in novel objects or new people. | | ☐ |
| 5. | Expresses two or more recognizable emotions such as pleasure, sadness, fear, or distress. | ☐ | |
| 6. | Shows anticipation of being picked up by caregiver. | ☐ | |
| 7. | Shows affection toward familiar people. | ☐ | |
| 8. | Shows interest in children or peers other than siblings. | | ☐ |
| 9. | Reaches for familiar person. | ☐ | |
| 10. | Plays with toy or other object alone or with others. | | ☐ |
| 11. | Plays very simple interaction games with others. | | ☐ |
| 12. | Uses common household objects for play. | | ☐ |
| 13. | Shows interest in activities of others. | | ☐ |
| 14. | Imitates simple adult movements, such as clapping hands or waving good-bye, in response to a model. | ☐ | |
| 2 15. | Laughs or smiles appropriately in response to positive statements. | ☐ | |
| 16. | Addresses at least two familiar people by name. | ☐ | |
| 17. | Shows desire to please caregiver. | ☐ | |
| 18. | Participates in at least one game or activity with others. | | ☐ |
| 19. | Imitates a relatively complex task several hours after it was performed by another. | ☐ | |
| 20. | Imitates adult phrases heard on previous occasions. | ☐ | |
| 21. | Engages in elaborate make-believe activities, alone or with others. | | ☐ |
| 22. | Shows a preference for some friends over others. | ☐ | |
| 23. | Says "please" when asking for something. | | ☐ |
| 24. | Labels happiness, sadness, fear, and anger in self. | ☐ | |
| 25. | Identifies people by characteristics other than name, when asked. | ☐ | |
| 26. | Shares toys or possessions without being told to do so. | | ☐ |
| 27. | Names one or more favorite television programs when asked, and tells on what days and channels the programs are shown. N MAY BE SCORED. | | ☐ |
| 28. | Follows rules in simple games without being reminded. | | ☐ |
| 29. | Has a preferred friend of either sex. | ☐ | |
| 30. | Follows school or facility rules. | | ☐ |
| 31. | Responds verbally and positively to good fortune of others. | ☐ | |
| 32. | Apologizes for unintentional mistakes. | | ☐ |
| 33. | Has a group of friends. | ☐ | |
| 34. | Follows community rules. | | ☐ |
| 35. | Plays more than one board or card game requiring skill and decision making. | | ☐ |
| 36. | Does not talk with food in mouth. | | ☐ |
| 37. | Has a best friend of the same sex. | ☐ | |
| | | 40 | 24 | 10 |

Count items before basal as 2, items after ceiling as 0.

Sum of 2s, 1s, 0s page **7**

**INTERPERSONAL RELATIONSHIPS**

**PLAY & LEISURE TIME**

**COPING SKILLS**

COMMENTS

**SOCIALIZATION DOMAIN**

SOCIALIZATION DOMAIN

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

| | | INTERPERSONAL RELATIONSHIPS | PLAY & LEISURE TIME | COPING SKILLS | COMMENTS |
|---|---|---|---|---|---|
| | 38. Responds appropriately when introduced to strangers. | | | ☐ | |
| 7, 8 | 39. Makes or buys small gifts for caregiver or family member on major holidays, on own initiative. | ☐ | | | |
| | 40. Keeps secrets or confidences for more than one day. | | | ☐ | |
| | 41. Returns borrowed toys, possessions, or money to peers, or returns borrowed books to library. | | | ☐ | |
| | 42. Ends conversations appropriately. | | | ☐ | |
| 9 | 43. Follows time limits set by caregiver. | | | ☐ | |
| | 44. Refrains from asking questions or making statements that might embarrass or hurt others. | | | ☐ | |
| | 45. Controls anger or hurt feelings when denied own way. | | | ☐ | |
| | 46. Keeps secrets or confidences for as long as appropriate. | | | ☐ | |
| 10, 11 | 47. Uses appropriate table manners without being told. DO NOT SCORE 1. | | | ☐ | |
| | 48. Watches television or listens to radio for information about a particular area of interest. N MAY BE SCORED. | | ☐ | | |
| | 49. Goes to evening school or facility events with friends, when accompanied by an adult. N MAY BE SCORED. | | ☐ | | |
| | 50. Independently weighs consequences of actions before making decisions. | | | ☐ | |
| | 51. Apologizes for mistakes or errors in judgment. | | | ☐ | |
| 12, 13, 14 | 52 Remembers birthdays or anniversaries of immediate family members and special friends. | ☐ | | | |
| | 53. Initiates conversations on topics of particular interest to others. | ☐ | | | |
| | 54. Has a hobby. | | ☐ | | |
| | 55. Repays money borrowed from caregiver. | | | ☐ | |
| 15 to 18+ | 56. Responds to hints or indirect cues in conversation. | ☐ | | | |
| | 57. Participates in nonschool sports. N MAY BE SCORED. | | ☐ | | |
| | 58. Watches television or listens to radio for practical, day-to-day information. N MAY BE SCORED. | | ☐ | | |
| | 59. Makes and keeps appointments. | | | ☐ | |
| | 60. Watches television or listens to radio for news independently. N MAY BE SCORED. | | ☐ | | |
| | 61. Goes to evening school or facility events with friends, without adult supervision. N MAY BE SCORED. | | ☐ | | |
| | 62. Goes to evening nonschool or nonfacility events with friends, without adult supervision. | | ☐ | | |
| | 63. Belongs to older adolescent organized club, interest group, or social or service organization. | ☐ | | | |
| | 64. Goes with one person of opposite sex to party or public event where many people are present. | ☐ | | | |
| | 65. Goes on double or triple dates. | ☐ | | | |
| | 66. Goes on single dates. | ☐ | | | |

Count items before basal as 2, items after ceiling as 0.

COMMENTS

| | | | | |
|---|---|---|---|---|
| 1. | 16 | 16 | 26 | Sum of 2s, 1s, 0s page **8** |
| 2. | | | | Sum of 2s, 1s, 0s page **7** |
| 3. | | | | Number of Ns pages **7** and **8** |
| 4. | | | | Number of DKs pages **7** and **8** |
| | 56 | 40 | 36 | **SUBDOMAIN RAW SCORE** (Add rows 1–4 above) |

**ITEM SCORES**

2 Yes, usually
1 Sometimes or partially
0 No, never
N No opportunity
DK Don't know

Note: The Motor Skills domain is for individuals 5-11-30 or under, and optional for older individuals for whom a motor deficit is suspected. See Chapters 4 and 5 in the manual for procedures for administering and scoring the Motor Skills domain for individuals 6-0-0 or older.

| | | GROSS | FINE | COMMENTS |
|---|---|---|---|---|
| 1. | Holds head erect for at least 15 seconds without assistance when held vertically in caregiver's arms. | | | |
| 2. | Sits supported for at least one minute. | | | |
| 3. | Picks up small object with hands, in any way. | | | |
| 4. | Transfers object from one hand to the other. | | | |
| 5. | Picks up small object with thumb and fingers. | | | |
| 6. | Raises self to sitting position and maintains position unsupported for at least one minute. | | | |
| 7. | Crawls across floor on hands and knees, without stomach touching floor. | | | |
| 8. | Opens doors that require only pushing or pulling. | | | |
| 9. | Rolls ball while sitting. | | | |
| 10. | Walks as primary means of getting around. | | | |
| 11. | Climbs both in and out of bed or steady adult chair. | | | |
| 12. | Climbs on low play equipment. | | | |
| 13. | Marks with pencil, crayon, or chalk on appropriate writing surface. | | | |
| 14. | Walks up stairs, putting both feet on each step. | | | |
| 15. | Walks down stairs, forward, putting both feet on each step. | | | |
| 16. | Runs smoothly, with changes in speed and direction. | | | |
| 17. | Opens doors by turning and pulling doorknobs. | | | |
| 18. | Jumps over small object. | | | |
| 19. | Screws and unscrews lid of jar. | | | |
| 20. | Pedals tricycle or other three-wheeled vehicle for at least six feet. N MAY BE SCORED. | | | |
| 21. | Hops on one foot at least once, while holding on to another person or stable object, without falling. | | | |
| 22. | Builds three-dimensional structures, with at least five blocks. | | | |
| 23. | Opens and closes scissors with one hand. | | | |
| 24. | Walks down stairs with alternating feet, without assistance. | | | |
| 25. | Climbs on high play equipment. | | | |
| 26. | Cuts across a piece of paper with scissors. | | | |
| 27. | Hops forward on one foot at least three times without losing balance. DO NOT SCORE 1. | | | |
| 28. | Completes non-inset puzzle of at least six pieces. DO NOT SCORE 1. | | | |
| 29. | Draws more than one recognizable form with pencils or crayons. | | | |
| 30. | Cuts paper along a line with scissors. | | | |
| 31. | Uses eraser without tearing paper. | | | |
| 32. | Hops forward on one foot with ease. DO NOT SCORE 1. | | | |
| 33. | Unlocks key locks. | | | |
| 34. | Cuts out complex items with scissors. | | | |
| 35. | Catches small ball thrown from a distance of 10 feet, even if moving is necessary to catch it. | | | |
| 36. | Rides bicycle without training wheels, without falling. N MAY BE SCORED. | | | |

Count items before basal as 2, items after ceiling as 0.

| | GROSS | FINE |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| | 40 | 32 |

Sum of 2s, 1s, 0s page **9**

Number of Ns page **9**

Number of DKs page **9**

**SUBDOMAIN RAW SCORE**
(Add rows 1–3 above)

COMMENTS

GROSS

FINE

MOTOR SKILLS DOMAIN

Note: The Maladaptive Behavior domain is for individuals 5-0-0 or older. Administration is optional.

**ITEM SCORES**
2 Yes, usually
1 Sometimes or partially
0 No, never
DO NOT SCORE N OR DK.

## PART 1

| | | | |
|---|---|---|---|
| 1. | Sucks thumb or fingers. | | |
| 2. | Is overly dependent. | | |
| 3. | Withdraws. | | |
| 4. | Wets bed. | | |
| 5. | Exhibits an eating disturbance. | | |
| 6. | Exhibits a sleep disturbance. | | |
| 7. | Bites fingernails. | | |
| 8. | Avoids school or work. | | |
| 9. | Exhibits extreme anxiety. | | |
| 10. | Exhibits tics. | | |
| 11. | Cries or laughs too easily. | | |
| 12. | Has poor eye contact. | | |
| 13. | Exhibits excessive unhappiness. | | |
| 14. | Grinds teeth during day or night. | | |
| 15. | Is too impulsive. | | |
| 16. | Has poor concentration and attention. | | |
| 17. | Is overly active. | | |
| 18. | Has temper tantrums. | | |
| 19. | Is negativistic or defiant. | | |
| 20. | Teases or bullies. | | |
| 21. | Shows lack of consideration. | | |
| 22. | Lies, cheats, or steals. | | |
| 23. | Is too physically aggressive. | | |
| 24. | Swears in inappropriate situations. | | |
| 25. | Runs away. | | |
| 26. | Is stubborn or sullen. | | |
| 27. | Is truant from school or work. | | |

A. PART 1 RAW SCORE
(Sum of 2s, 1s, 0s Part 1)

## PART 2

Note: Part 2 is for individuals who will be compared only with supplementary norm groups.

| | | | | Intensity Severe | Intensity Moderate |
|---|---|---|---|---|---|
| 28. | Engages in inappropriate sexual behavior. | | | S | M |
| 29. | Has excessive or peculiar preoccupations with objects or activities. | | | S | M |
| 30. | Expresses thoughts that are not sensible. | | | S | M |
| 31. | Exhibits extremely peculiar mannerisms or habits. | | | S | M |
| 32. | Displays behaviors that are self-injurious. | | | S | M |
| 33. | Intentionally destroys own or another's property. | | | S | M |
| 34. | Uses bizarre speech. | | | S | M |
| 35. | Is unaware of what is happening in immediate surroundings. | | | S | M |
| 36. | Rocks back and forth when sitting or standing. | | | S | M |

B. Sum of 2s, 1s, 0s Part 2

PARTS 1 AND 2 RAW SCORE
(Add A and B)

COMMENTS

COMMENTS

## ABOUT THE INTERVIEW:

Respondent's estimate of the individual's functioning

Language used in the interview

Special characteristics of the individual

Estimate of rapport established with the respondent

Estimate of the respondent's accuracy

General observations

# Vineland Adaptive Behavior Scales: INTERVIEW EDITION Survey Form

Individual's name _____ Chronological age _____

Date of interview _____ Supplementary norm group (if applicable) _____

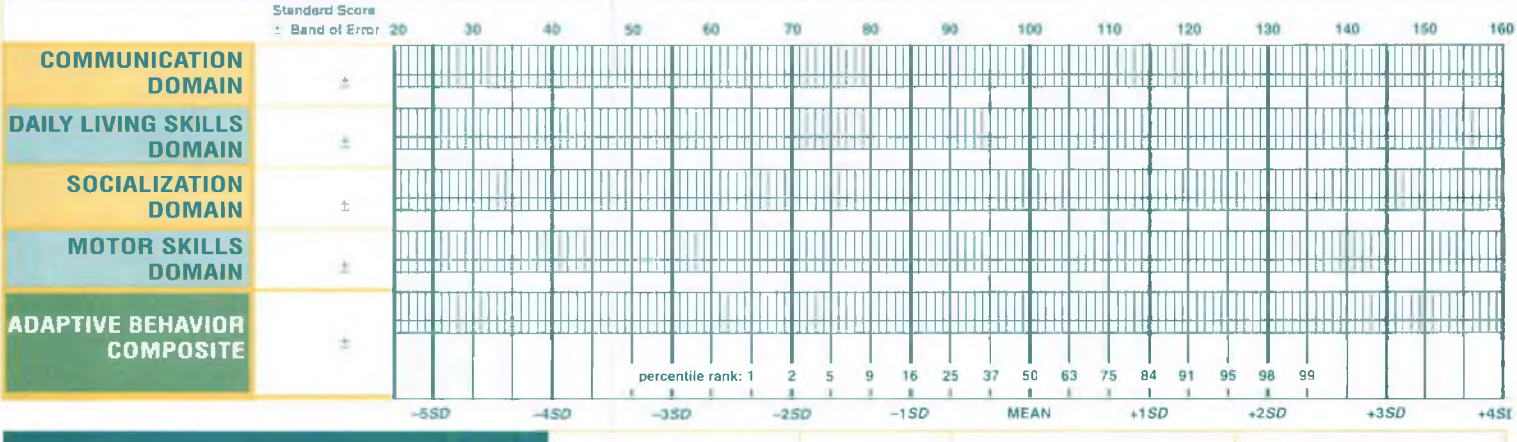
Before beginning the score summary, read Chapter 5 in the manual.

## SCORE SUMMARY

| SUBDOMAIN | Raw Score | Standard Score $\bar{X}$=100, $SD$=15 Tables B.1 and B.2 | Band of Error ___% Confidence Table B.3 | National %ile Rank Table B.4 | Stanine Table B.4 | Supplementary Norm Group %ile Rank Table B.5 | Adaptive Level Tables B.6 and B.8 | Supplementary Norm Group Adaptive Level Tables B.7 and B.9 | Age Equivalent Tables B.10 and B.11 |
|---|---|---|---|---|---|---|---|---|---|
| Receptive | | | | | | | | | |
| Expressive | | | | | | | | | |
| Written | | | | | | | | | |
| COMMUNICATION DOMAIN SUM | | | ± | | | | | | |
| Personal | | | | | | | | | |
| Domestic | | | | | | | | | |
| Community | | | | | | | | | |
| DAILY LIVING SKILLS DOMAIN SUM | | | ± | | | | | | |
| Interpersonal Relationships | | | | | | | | | |
| Play and Leisure Time | | | | | | | | | |
| Coping Skills | | | | | | | | | |
| SOCIALIZATION DOMAIN SUM | | | ± | | | | | | |
| (For ages to 5-11-30) Gross | | | | | | | | | |
| Fine | | | | | | | | | |
| MOTOR SKILLS DOMAIN SUM | | | ± | | | | | | |
| SUM OF DOMAIN STANDARD SCORES | | | | | | | | | |
| ADAPTIVE BEHAVIOR COMPOSITE | | | ± | | | | | | |

(See Chapter 5 in the manual to graph scores.)

## SCORE PROFILE




| OPTIONAL MALADAPTIVE BEHAVIOR DOMAIN (Administer for ages 5-0-0 and older) | | Raw Score | Maladaptive Level: Table B.12 | Supplementary Norm Group Maladaptive Level: Table B.13 |
|---|---|---|---|---|
| | Part 1 | | | |
| | Parts 1 and 2 | | | |

Additional interpretive information (see Chapters 5 and 6 in the manual)

Recommendations



B 0 9 8 7

# APPENDIX B

Child Behavior Checklists

*Please print* # CHILD BEHAVIOR CHECKLIST FOR AGES 6-18

For office use only
ID #

CHILD'S FULL NAME First Middle Last

CHILD'S GENDER ☐ Boy ☐ Girl

CHILD'S AGE

CHILD'S ETHNIC GROUP OR RACE

TODAY'S DATE Mo._____ Date _____ Yr. _____

CHILD'S BIRTHDATE Mo._____ Date _____ Yr. _____

GRADE IN SCHOOL _____

NOT ATTENDING SCHOOL ☐

Please fill out this form to reflect *your* view of the child's behavior even if other people might not agree. Feel free to print additional comments beside each item and in the space provided on page 2. ***Be sure to answer all items.***

**PARENTS' USUAL TYPE OF WORK, even if not working now.** *(Please be specific — for example, auto mechanic, high school teacher, homemaker, laborer, lathe operator, shoe salesman, army sergeant.)*

FATHER'S TYPE OF WORK _____

MOTHER'S TYPE OF WORK _____

**THIS FORM FILLED OUT BY: (print your full name)**

_____

Your gender: ☐ Male ☐ Female

Your relation to the child:

☐ Biological Parent ☐ Step Parent ☐ Grandparent

☐ Adoptive Parent ☐ Foster Parent ☐ Other (specify)_____

**I. Please list the sports your child most likes to take part in.** For example: swimming, baseball, skating, skate boarding, bike riding, fishing, etc.

☐ None

| | Compared to others of the same age, about how much time does he/she spend in each? | | | | Compared to others of the same age, how well does he/she do each one? | | | |
|---|---|---|---|---|---|---|---|---|
| | Less Than Average | Average | More Than Average | Don't Know | Below Average | Average | Above Average | Don't Know |
| a. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| b. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| c. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**II. Please list your child's favorite hobbies, activities, and games, other than sports.** For example: stamps, dolls, books, piano, crafts, cars, computers, singing, etc. (Do ***not*** include listening to radio or TV.)

☐ None

| | Compared to others of the same age, about how much time does he/she spend in each? | | | | Compared to others of the same age, how well does he/she do each one? | | | |
|---|---|---|---|---|---|---|---|---|
| | Less Than Average | Average | More Than Average | Don't Know | Below Average | Average | Above Average | Don't Know |
| a. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| b. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| c. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**III. Please list any organizations, clubs, teams, or groups your child belongs to.**

☐ None

| | Compared to others of the same age, how active is he/she in each? | | | |
|---|---|---|---|---|
| | Less Active | Average | More Active | Don't Know |
| a. _____ | ☐ | ☐ | ☐ | ☐ |
| b. _____ | ☐ | ☐ | ☐ | ☐ |
| c. _____ | ☐ | ☐ | ☐ | ☐ |

**IV. Please list any jobs or chores your child has.** For example: paper route, babysitting, making bed, working in store, etc. (Include both paid and unpaid jobs and chores.)

☐ None

| | Compared to others of the same age, how well does he/she carry them out? | | | |
|---|---|---|---|---|
| | Below Average | Average | Above Average | Don't Know |
| a. _____ | ☐ | ☐ | ☐ | ☐ |
| b. _____ | ☐ | ☐ | ☐ | ☐ |
| c. _____ | ☐ | ☐ | ☐ | ☐ |

***Be sure you answered all items. Then see other side.***



**6-1-01 Edition - 201**

*Please print. Be sure to answer all items.*

**V. 1. About how many close friends does your child have? (Do *not* include brothers & sisters)**

❒ None ❒ 1 ❒ 2 or 3 ❒ 4 or more

**2. About how many times a week does your child do things with any friends outside of regular school hours? (Do *not* include brothers & sisters)**

❒ Less than 1 ❒ 1 or 2 ❒ 3 or more

**VI. Compared to others of his/her age, how well does your child:**

| | Worse | Average | Better | |
|---|---|---|---|---|
| a. Get along with his/her brothers & sisters? | ❒ | ❒ | ❒ | ❒ Has no brothers or sisters |
| b. Get along with other kids? | ❒ | ❒ | ❒ | |
| c. Behave with his/her parents? | ❒ | ❒ | ❒ | |
| d. Play and work alone? | ❒ | ❒ | ❒ | |

**VII. 1. Performance in academic subjects.** ❒ Does not attend school because _____

| *Check a box for each subject that child takes* | Failing | Below Average | Average | Above Average |
|---|---|---|---|---|
| a. Reading, English, or Language Arts | ❒ | ❒ | ❒ | ❒ |
| b. History or Social Studies | ❒ | ❒ | ❒ | ❒ |
| c. Arithmetic or Math | ❒ | ❒ | ❒ | ❒ |
| d. Science | ❒ | ❒ | ❒ | ❒ |
| e. _____ | ❒ | ❒ | ❒ | ❒ |
| f. _____ | ❒ | ❒ | ❒ | ❒ |
| g. _____ | ❒ | ❒ | ❒ | ❒ |

Other academic subjects–for example: computer courses, foreign language, business. Do *not* include gym, shop, driver's ed., or other nonacademic subjects.

**2. Does your child receive special education or remedial services or attend a special class or special school?**

❒ No ❒ Yes—kind of services, class, or school:

**3. Has your child repeated any grades?** ❒ No ❒ Yes—grades and reasons:

**4. Has your child had any academic or other problems in school?** ❒ No ❒ Yes—please describe:

**When did these problems start?**_____

**Have these problems ended?** ❒ No ❒ Yes–when?

**Does your child have any illness or disability (either physical or mental)?** ❒ No ❒ Yes—please describe:

**What concerns you most about your child?**

**Please describe the best things about your child.**



*Be sure you answered all items*

***Please print. Be sure to answer all items.***

Below is a list of items that describe children and youths. For each item that describes your child ***now or within the past 6 months***, please circle the ***2*** if the item is ***very true or often true*** of your child. Circle the ***1*** if the item is ***somewhat or sometimes true*** of your child. If the item is ***not true*** of your child, circle the ***0***. Please answer all items as well as you can, even if some do not seem to apply to your child.

**0 = Not True (as far as you know)** **1 = Somewhat or Sometimes True** **2 = Very True or Often True**

0 1 2 1. Acts too young for his/her age
0 1 2 2. Drinks alcohol without parents' approval (describe):_____
_____
0 1 2 3. Argues a lot
0 1 2 4. Fails to finish things he/she starts
0 1 2 5. There is very little he/she enjoys
0 1 2 6. Bowel movements outside toilet
0 1 2 7. Bragging, boasting
0 1 2 8. Can't concentrate, can't pay attention for long
0 1 2 9. Can't get his/her mind off certain thoughts; obsessions (describe): _____
_____
0 1 2 10. Can't sit still, restless, or hyperactive
0 1 2 11. Clings to adults or too dependent
0 1 2 12. Complains of loneliness
0 1 2 13. Confused or seems to be in a fog
0 1 2 14. Cries a lot
0 1 2 15. Cruel to animals
0 1 2 16. Cruelty, bullying, or meanness to others
0 1 2 17. Daydreams or gets lost in his/her thoughts
0 1 2 18. Deliberately harms self or attempts suicide
0 1 2 19. Demands a lot of attention
0 1 2 20. Destroys his/her own things
0 1 2 21. Destroys things belonging to his/her family or others
0 1 2 22. Disobedient at home
0 1 2 23. Disobedient at school
0 1 2 24. Doesn't eat well
0 1 2 25. Doesn't get along with other kids
0 1 2 26. Doesn't seem to feel guilty after misbehaving
0 1 2 27. Easily jealous
0 1 2 28. Breaks rules at home, school, or elsewhere
0 1 2 29. Fears certain animals, situations, or places, other than school (describe): _____
_____
0 1 2 30. Fears going to school
0 1 2 31. Fears he/she might think or do something bad
0 1 2 32. Feels he/she has to be perfect
0 1 2 33. Feels or complains that no one loves him/her
0 1 2 34. Feels others are out to get him/her
0 1 2 35. Feels worthless or inferior
0 1 2 36. Gets hurt a lot, accident-prone
0 1 2 37. Gets in many fights
0 1 2 38. Gets teased a lot
0 1 2 39. Hangs around with others who get in trouble
0 1 2 40. Hears sounds or voices that aren't there (describe): _____
_____
0 1 2 41. Impulsive or acts without thinking
0 1 2 42. Would rather be alone than with others
0 1 2 43. Lying or cheating
0 1 2 44. Bites fingernails
0 1 2 45. Nervous, highstrung, or tense
0 1 2 46. Nervous movements or twitching (describe): ____
_____
_____
0 1 2 47. Nightmares
0 1 2 48. Not liked by other kids
0 1 2 49. Constipated, doesn't move bowels
0 1 2 50. Too fearful or anxious
0 1 2 51. Feels dizzy or lightheaded
0 1 2 52. Feels too guilty
0 1 2 53. Overeating
0 1 2 54. Overtired without good reason
0 1 2 55. Overweight
56. Physical problems ***without known medical cause:***
0 1 2 a. Aches or pains (***not*** stomach or headaches)
0 1 2 b. Headaches
0 1 2 c. Nausea, feels sick
0 1 2 d. Problems with eyes (***not*** if corrected by glasses) (describe): _____
0 1 2 e. Rashes or other skin problems
0 1 2 f. Stomachaches
0 1 2 g. Vomiting, throwing up
0 1 2 h. Other (describe): _____
_____

 ***Be sure you answered all items. Then see other side.***

***Please print. Be sure to answer all items.***

**0 = Not True (as far as you know)** **1 = Somewhat or Sometimes True** **2 = Very True or Often True**

0 1 2 57. Physically attacks people
0 1 2 58. Picks nose, skin, or other parts of body (describe): _____
_____
0 1 2 59. Plays with own sex parts in public
0 1 2 60. Plays with own sex parts too much
0 1 2 61. Poor school work
0 1 2 62. Poorly coordinated or clumsy
0 1 2 63. Prefers being with older kids
0 1 2 64. Prefers being with younger kids
0 1 2 65. Refuses to talk
0 1 2 66. Repeats certain acts over and over; compulsions (describe): _____
_____
0 1 2 67. Runs away from home
0 1 2 68. Screams a lot
0 1 2 69. Secretive, keeps things to self
0 1 2 70. Sees things that aren't there (describe): _____
_____
_____
0 1 2 71. Self-conscious or easily embarrassed
0 1 2 72. Sets fires
0 1 2 73. Sexual problems (describe): _____
_____
_____
0 1 2 74. Showing off or clowning
0 1 2 75. Too shy or timid
0 1 2 76. Sleeps less than most kids
0 1 2 77. Sleeps more than most kids during day and/or night (describe): _____
_____
0 1 2 78. Inattentive or easily distracted
0 1 2 79. Speech problem (describe): _____
_____
0 1 2 80. Stares blankly
0 1 2 81. Steals at home
0 1 2 82. Steals outside the home
0 1 2 83. Stores up too many things he/she doesn't need (describe): _____
_____
_____
0 1 2 84. Strange behavior (describe): _____
_____
0 1 2 85. Strange ideas (describe): _____
_____
0 1 2 86. Stubborn, sullen, or irritable
0 1 2 87. Sudden changes in mood or feelings
0 1 2 88. Sulks a lot
0 1 2 89. Suspicious
0 1 2 90. Swearing or obscene language
0 1 2 91. Talks about killing self
0 1 2 92. Talks or walks in sleep (describe): _____
_____
0 1 2 93. Talks too much
0 1 2 94. Teases a lot
0 1 2 95. Temper tantrums or hot temper
0 1 2 96. Thinks about sex too much
0 1 2 97. Threatens people
0 1 2 98. Thumb-sucking
0 1 2 99. Smokes, chews, or sniffs tobacco
0 1 2 100. Trouble sleeping (describe): _____
_____
0 1 2 101. Truancy, skips school
0 1 2 102. Underactive, slow moving, or lacks energy
0 1 2 103. Unhappy, sad, or depressed
0 1 2 104. Unusually loud
0 1 2 105. Uses drugs for nonmedical purposes (***don't*** include alcohol or tobacco) (describe): _____
_____
_____
0 1 2 106. Vandalism
0 1 2 107. Wets self during the day
0 1 2 108. Wets the bed
0 1 2 109. Whining
0 1 2 110. Wishes to be of opposite sex
0 1 2 111. Withdrawn, doesn't get involved with others
0 1 2 112. Worries
113. Please write in any problems your child has that were not listed above:
0 1 2 _____
0 1 2 _____
0 1 2 _____



***Please be sure you answered all items.***

# APPENDIX C

## Parental Demographics Questionnaire (Parents of ALL Survivors)

1. What is your child's birth date? _____

2. Child's Gender: Male _____ Female _____

3. What types of medical problems did your child have prior to the leukemia diagnosis?
_____
_____
_____

4. How old was your child when he/she was diagnosed with acute lymphoblastic leukemia? _____

5. What type of medical treatment did your child receive?
   _____ Chemotherapy
   _____ Radiation Therapy
   _____ Other (please specify: _____ )

6. Approximately when did your child complete treatment? _____

7. What is your child's grade level? _____

8. On average, how much school did your child miss due to illness and treatment?
_____
_____

9. Has your child been diagnosed with a learning disorder? _____ Yes _____ No

   If yes, does your children receive special services at school? ____ Yes ____ No

   Please specify services: _____

10. What is the highest grade level of school you completed? _____

11. Are you currently employed? _____ Yes _____ No

If yes, where are you employed? _____

Please provide a brief job description: _____

_____

_____

12. What is your family's average yearly income?

_____ Less than $5, 000

_____ $5,000 - $20,000

_____ $20,000 - $40,000

_____ $40,000- $60,000

_____ More than $60,000

# APPENDIX D

Parental Demographics Questionnaire (Parents of Healthy Controls)

1. What is your child's birth date? _____

2. Child's Sex: Male _____ Female _____

3. What types of medical problems has your child had?

_____
_____
_____

4. What is your child's grade level? _____

5. Has your child been diagnosed with a learning disorder? _____ Yes _____ No

If yes, does your children receive special services at school? ____ Yes ____ No

Please specify services: _____

6. What is the highest grade level of school you completed? _____

7. Are you currently employed? _____ Yes _____ No

If yes, where are you employed? _____

Please provide a brief job description: _____

_____
_____

8. What is your family's average yearly income?

_____ Less than $5, 000

_____ $5,000 - $20,000

_____ $20,000 - $40,000

_____ $40,000- $60,000

_____ More than $60,000

# APPENDIX E

## Parental Assessment of Academic Achievement

Participant # _____

**For each of the academic subjects listed, please indicate the level at which you believe that your child has functioned since ending chemotherapy treatment. If the subject is not applicable, please indicate that in the "Not Applicable" area. In the comments sections, please characterize the nature of your son or daughter's difficulty within each subject area.**

---

**Science (and Health)**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | Moderate Difficulty | | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**Math**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | Moderate Difficulty | | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

Participant #_____

**Reading**
Not applicable _____

1 2 3 4 5 6 7 8 9 10
No difficulty Moderate Difficulty Severe Difficulty

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**Writing**
Not applicable _____

1 2 3 4 5 6 7 8 9 10
No difficulty Moderate Difficulty Severe Difficulty

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**English**
Not applicable _____

1 2 3 4 5 6 7 8 9 10
No difficulty Moderate Difficulty Severe Difficulty

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

Participant # _____

**Social Studies (including Psychology and Religion)**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | | Moderate Difficulty | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**History**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | | Moderate Difficulty | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**Foreign Language**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | | Moderate Difficulty | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

Participant # _____

**Art**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | Moderate Difficulty | | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**Music**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | Moderate Difficulty | | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

**Physical Education**
Not applicable _____

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| No difficulty | | | Moderate Difficulty | | | | | Severe Difficulty | |

Average Grade: _____

Comments:

_____
_____
_____
_____
_____

APPENDIX F

Consent Letter (Parents of ALL survivors)

To Whom It May Concern:

My name is Maria Furnari and I am currently a graduate student in the Master's Program in Clinical Psychology at the University of Dayton. Prior to coming to Dayton, I completed my undergraduate work at St. John Fisher College in Rochester, NY. During that time, I was able to do some work at the Golisano Children's Hospital at Strong and had the pleasure of meeting several wonderful families at the Outpatient Hematology/Oncology Clinic. Through my contact with these families, especially the inspiring children who were successfully battling cancer, I established my goal for my future. I want to work with these brave children and help them through the challenges that accompany diagnosis and treatment, both during and after their medical treatment.

With that said, I have decided that I would learn a great deal more about childhood cancer if my masters' research explored various issues associated with the disease. With the supervision of Dr. Roger N. Reeb, Associate Professor of Psychology, University of Dayton, I have developed a project that would assess a child's adjustment abilities after he/she has completed his/her medical treatment. I am seeking the cooperation of ***parents*** who have had a child diagnosed and successfully treated for acute lymphoblastic leukemia (ALL) at any time in the past. In other words, I will ***not*** be seeking any information directly from the children.

The project requires the completion of three short questionnaires by a parent. The entire process should take approximately 45-60 minutes. I am willing to come to your home with the questionnaires, meet you at the clinic during a check-up visit – wherever it would be most convenient for you. I would GREATLY appreciate any volunteers for this project and I thank you in advance for allowing me the opportunity to learn more about childhood cancer and what can be done to help these wonderful children throughout the entire experience.

If you are interested in taking part in this project, please contact me at either of these phone numbers – (937) 297-1568 or (585) 820-8996. You can also reach me by email at furnarme@notes.udayton.edu. Once again, I appreciate as much parental involvement as possible and thank you for your assistance.

Sincerely,

Maria Furnari

# APPENDIX G

Consent Letter (Parents of Healthy Children)

To Whom It May Concern:

My name is Maria Furnari and I am currently a graduate student in the Master's Program in Clinical Psychology at the University of Dayton. Prior to coming to Dayton, I completed my undergraduate work at St. John Fisher College in Rochester, NY. During that time, I was able to do some work at the Golisano Children's Hospital at Strong and had the pleasure of meeting several wonderful families at the Outpatient Hematology/Oncology Clinic. Through my contact with these families, especially the inspiring children who were successfully battling cancer, I established my goal for my future. I want to work with these brave children and help them through the challenges that accompany diagnosis and treatment, both during and after their medical treatment.

With that said, I have decided that I would learn a great deal more about childhood cancer if my masters' research explored various issues associated with the disease. With the supervision of Dr. Roger N. Reeb, Associate Professor of Psychology, University of Dayton, I have developed a project that would assess a child's adjustment abilities after he/she has completed his/her medical treatment. I am seeking the cooperation of ***parents*** who have had a child who has never been diagnosed with a life-threatening illness. In other words, I will ***not*** be seeking any information directly from the children. I am looking to compare the adjustment abilities of children who have been treated for a life-threatening illness to those children who have been never diagnosed and treated for Acute Lymphoblastic Leukemia.

The project requires the completion of four short questionnaires by a parent. The entire process should take approximately 45-60 minutes. I am willing to come to your home with the questionnaires, meet you at the clinic during a check-up visit – wherever it would be most convenient for you. I would GREATLY appreciate any volunteers for this project and I thank you in advance for allowing me the opportunity to learn more about childhood cancer and what can be done to help these wonderful children throughout the entire experience.

If you are interested in taking part in this project, please contact me at either of these phone numbers – (937) 297-1568 or (585) 820-8996. You can also reach me by email at furnarme@notes.udayton.edu. Once again, I appreciate as much parental involvement as possible and thank you for your assistance.

Sincerely,

Maria Furnari

APPENDIX H

Informed Consent (Parents of ALL survivors)

## Informed Consent

**Project Title:** Psychosocial Adjustment in Childhood Cancer Survivors: Parent's Report

**Investigators:** Maria Furnari, Roger N. Reeb, Ph.D.

**Description of Study:** Participants are asked to complete four questionnaires related to their child who has been diagnosed and treated for Acute Lymphoblastic Leukemia.

**Adverse Effects and Risks:** No adverse effects are anticipated. This study only requests parents to provide information about their child. We realize that some questions may be discomforting to you. If so, you may skip particular questions or you may stop the interview. We are asking these questions to understand more about the health, well-being, and treatment of present and future children who have this disease. We appreciate your cooperation.

**Duration of Study:** It will take each participant approximately 45-60 minutes to complete this study.

**Confidentiality of Data:** Your name will be kept separate from the data. Both your name and data will be kept in a locked filing cabinet. Your name will not be revealed in any documents related to this study.

**Contact Person:** Participants may contact Roger N. Reeb, Ph.D. at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. Participants may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

**Consent to Participate:** I have voluntarily decided to participate in this study. The investigator named above has adequately answered any and all questions I have about this study, the procedures involved, and my participation. I understand that the investigator named above will be available to answer any questions about research procedures throughout this study. I also understand that I may voluntarily terminate my participation in this study at any time. I also understand that the investigator named above may terminate my participation in this study if s/he feels this to be in my best interest. In addition, I certify that I am 18 (eighteen) years of age or older.

_____

Signature of Participant  Participant's Name (printed)  Date

_____

Signature of Witness  Date

# APPENDIX I

Informed Consent (Parents of Healthy Controls)

## Informed Consent

**Project Title:** Psychosocial Adjustment in Childhood Cancer Survivors: A Parent's Report

**Investigators:** Maria Furnari, Roger N. Reeb, Ph.D.

**Description of Study:** Participants are asked to complete four questionnaires related to their child who has never been diagnosed with a life-threatening illness.

**Adverse Effects and Risks:** No adverse effects are anticipated. This study merely requests parents to provide information about their child.

**Duration of Study:** It will take each participant approximately 45-60 minutes to complete this study.

**Confidentiality of Data:** Your name will be kept separate from the data. Both your name and data will be kept in a locked filing cabinet. Your name will not be revealed in any documents related to this study.

**Contact Person:** Participants may contact Roger N. Reeb, Ph.D. at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. Participants may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

**Consent to Participate:** I have voluntarily decided to participate in this study. The investigator named above has adequately answered any and all questions I have about this study, the procedures involved, and my participation. I understand that the investigator named above will be available to answer any questions about research procedures throughout this study. I also understand that I may voluntarily terminate my participation in this study at any time. I also understand that the investigator named above may terminate my participation in this study if s/he feels this to be in my best interest. In addition, I certify that I am 18 (eighteen) years of age or older.

_____

Signature of Participant  Participant's Name (printed)  Date

_____

Signature of Witness  Date

APPENDIX J

Informed Consent – Telephone (Parents of ALL Survivors)

**Informed Consent (Phone Script)**

"Prior to beginning our session together, I need to obtain your informed consent and share with you several details pertaining to the study. I am working under the supervision of Dr. Roger Reeb. The project has been entitled 'Psychosocial Adjustment in Childhood Cancer Survivors: Parent's Report.' We are asking parents to complete four questionnaires related to their child who has been diagnosed and treated for Acute Lymphoblastic Leukemia. No adverse effects are anticipated since the study is only asking you to provide information about your child. We realize that some questions may be discomforting to you. If so, you may skip particular questions or you may stop the interview. We are asking these questions to understand more about the health, well-being, and treatment of present and future children who have this disease. It will take us approximately 30-45 minutes to complete this study. All data obtained will remain confidential. Your name will be kept separate from the data. Both your name and data will be kept in a locked filing cabinet. Your name will not be revealed in any documents related to this study. If you have any questions, you may contact Dr. Roger Reeb at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. You may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

I now need your consent to participate. Please answer yes to the following statements if you agree to them:

You have voluntarily decided to participate in this study. _____ yes _____ no

I have answered any and all questions you have about this study, the procedures involved, and your participation. _____ yes _____ no

You understand that I will be available to answer any questions about research procedures throughout this study. _____ yes _____ no

You understand that you may voluntarily terminate your participation in this study at any time. _____ yes _____ no

You understand that I may terminate your participation in this study if I feel this to be in your best interest. _____ yes _____ no

You certify that you are 18 (eighteen) years of age or older. _____ yes _____ no

Thank you for participating in this study."

_____

Signature of Witness Date

# APPENDIX K

## Informed Consent – Telephone (Parents of Healthy Children)

## Informed Consent (Phone Script)

"Prior to beginning our session together, I need to obtain your informed consent and share with you several details pertaining to the study. I am working under the supervision of Dr. Roger Reeb. The project has been entitled 'Psychosocial Adjustment in Childhood Cancer Survivors: Parent's Report.' We are asking parents to complete four questionnaires related to their child who has never been diagnosed with a life threatening illness. No adverse effects are anticipated since the study is only asking you to provide information about your child. We are asking these questions to understand more about the health, well-being, and treatment of present and future children who have this disease. It will take us approximately 30-45 minutes to complete this study. All data obtained will remain confidential. Your name will be kept separate from the data. Both your name and data will be kept in a locked filing cabinet. Your name will not be revealed in any documents related to this study. If you have any questions, you may contact Dr. Roger Reeb at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. You may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

I now need your consent to participate. Please answer yes to the following statements if you agree to them:

You have voluntarily decided to participate in this study. _____ yes _____ no

I have answered any and all questions you have about this study, the procedures involved, and your participation. _____ yes _____ no

You understand that I will be available to answer any questions about research procedures throughout this study. _____ yes _____ no

You understand that you may voluntarily terminate your participation in this study at any time. _____ yes _____ no

You understand that I may terminate your participation in this study if I feel this to be in your best interest. _____ yes _____ no

You certify that you are 18 (eighteen) years of age or older. _____ yes _____ no

Thank you for participating in this study."

_____

Signature of Witness Date

# APPENDIX L

## Debriefing (Parents of ALL Survivors)

# DEBRIEFING FORM

## Information about the Study

The purpose of this study is to determine the extent to which adjustment differences are present between children who have been treated for acute lymphoblastic leukemia when compared to children who have never been treated for a life-threatening illness. Specifically, the main focus of this study is on adaptation in daily living, an important factor in the child being able to acclimate oneself to a normal home and school environment.

A great amount of research has focused on the effects that cranial irradiation, either used alone or in combination with chemotherapy, has had on a child. Significantly less attention has been focused on the effects of using chemotherapy alone. Furthermore, the emphasis within the literature has been placed on the cognitive, academic, and neuropsychological effects that cancer treatments have on the child. However, the adaptive functioning problems that might arise as a result of the cancer treatment, specifically the use of chemotherapy, is not prevalent within the literature. The instruments used in this study assess your child's personal and social skills (ie. communication, daily living skills, etc.), internalizing and externalizing problems (ie. anxiety/depression, social problems, attention problems, etc.), academic abilities and concerns, as well demographic information. Therefore, this study compares your child's ability to adjust to daily living in several different capacities to the abilities exhibited by children who have been treated with chemotherapy.

**References**

Here are some references in case you are interested in learning more about the effects of chemotherapy on children:

Brown, R.T., & Madan-Swain, A. (1993). Cognitive, neuropsychological, and academic sequela in children with leukemia. Journal of Leaning Disabilities, 26, 74-90.

Butler, R.W., Rizzi, L.P., & Bandilla, E.B. (1999). The effects of childhood cancer and its treatment on two objective measures of psychological functioning. Children's HealthCare, 28(4), 311-327.

Reeb, R.N. & Regan, J.M. (1998). Survivors of pediatric cancer: Cognitive sequelae. Journal of Psychological Practice, 4 (2), 61-76.

Regan, J.M., & Reeb, R.N. (1998). Neuropsychological functioning in survivors of childhood leukemia. Child Study Journal, 28 (3), 179-200.

**Assurance of Privacy**

Your name will be kept separate from the data. Both your name and data will be kept in a locked file cabinet. Your name will not appear on any document related to this study.

**Contact Information**

Participants may contact Roger N. Reeb, Ph.D. at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. Participants may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

Thank you for participating in this study!

# APPENDIX M

Debriefing (Parents of Healthy Children)

# DEBRIEFING FORM

## Information about the Study

The purpose of this study is to determine the extent to which adjustment differences are present between children who have been treated for acute lymphoblastic leukemia when compared to children who have never been treated for a life-threatening illness. Specifically, the main focus of this study is on adaptation in daily living, an important factor in the child being able to acclimate oneself to a normal home and school environment.

A great amount of research has focused on the effects that cranial irradiation, either used alone or in combination with chemotherapy, has had on a child. Significantly less attention has been focused on the effects of using chemotherapy alone. Furthermore, the emphasis within the literature has been placed on the cognitive, academic, and neuropsychological effects that cancer treatments have on the child. However, the adaptive functioning problems that might arise as a result of the cancer treatment, specifically the use of chemotherapy, is not prevalent within the literature. The instruments used in this study assess your child's personal and social skills (ie. communication, daily living skills, etc.), internalizing and externalizing problems (ie. anxiety/depression, social problems, attention problems, etc.), academic abilities and concerns, as well demographic information. Therefore, this study compares your child's ability to adjust to daily living in several different capacities to the abilities exhibited by children who have been treated with chemotherapy.

**References**

Here are some references in case you are interested in learning more about the effects of chemotherapy on children:

Brown, R.T., & Madan-Swain, A. (1993). Cognitive, neuropsychological, and academic sequela in children with leukemia. Journal of Leaning Disabilities, 26, 74-90.

Butler, R.W., Rizzi, L.P., & Bandilla, E.B. (1999). The effects of childhood cancer and its treatment on two objective measures of psychological functioning. Children's HealthCare, 28(4), 311-327.

Reeb, R.N. & Regan, J.M. (1998). Survivors of pediatric cancer: Cognitive sequelae. Journal of Psychological Practice, 4 (2), 61-76.

Regan, J.M., & Reeb, R.N. (1998). Neuropsychological functioning in survivors of childhood leukemia. Child Study Journal, 28 (3), 179-200.

**Assurance of Privacy**

Your name will be kept separate from the data. Both your name and data will be kept in a locked file cabinet. Your name will not appear on any document related to this study.

**Contact Information**

Participants may contact Roger N. Reeb, Ph.D. at 937-229-2395 or by email at roger.reeb@notes.udayton.edu. Participants may also contact the Chair of the Research Review and Ethics Committee, Charles E. Kimble, Ph.D. at 937-229-2167 or by email at charles.kimble@notes.udayton.edu.

Thank you for participating in this study!

# APPENDIX N

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

No Treatment vs. Combination Treatment

Appendix N

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

| | Comparison Groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measures by Subject | Healthy | | | Combination | | | | | |
| | N | M | SD | N | M | SD | t | df | p |
| Adaptive Behavior Composite | 30 | 101.07 | 15.23 | 12 | 82.67 | 10.94 | 3.80 | 40 | 0.000 |
| *Domains* | | | | | | | | | |
| Communication | 30 | 103.00 | 16.31 | 12 | 84.08 | 18.76 | 3.25 | 40 | 0.002 |
| Daily Living Skills | 30 | 98.77 | 12.61 | 12 | 90.83 | 13.40 | 1.81 | 40 | 0.078 |
| Socialization | 30 | 101.27 | 12.26 | 12 | 85.25 | 13.00 | 3.76 | 40 | 0.001 |

APPENDIX O

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

No Treatment vs. Chemotherapy Only

Appendix O

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

| | Comparison Groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measures by Subject | Healthy | | | Chemotherapy | | | | | |
| | N | M | SD | N | M | SD | t | df | p |
| Adaptive Behavior Composite | 30 | 101.07 | 15.23 | 18 | 89.89 | 17.82 | 2.31 | 46 | 0.025 |
| *Domains* | | | | | | | | | |
| Communication | 30 | 103.00 | 16.31 | 18 | 94.22 | 13.86 | 1.905 | 46 | 0.063 |
| Daily Living Skills | 30 | 98.77 | 12.61 | 18 | 87.00 | 21.16 | 2.42 | 46 | 0.019 |
| Socialization | 30 | 101.27 | 12.26 | 18 | 96.44 | 14.79 | 1.221 | 46 | 0.228 |

APPENDIX P

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

Chemotherapy Only vs. Combination Treatment

Appendix P

Mean Standard Scores on a Measure of Adaptive Behavior as a Function of Group

| | Comparison Groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measures by Subject | Combination | | | Chemotherapy | | | | | |
| | N | M | SD | N | M | SD | t | df | p |
| Adaptive Behavior Composite | 12 | 82.67 | 10.94 | 18 | 89.89 | 17.82 | 1.25 | 28 | 0.221 |
| *Domains* | | | | | | | | | |
| Communication | 12 | 84.08 | 18.76 | 18 | 94.22 | 13.86 | 1.603 | 28 | 0.099 |
| Daily Living Skills | 12 | 90.83 | 13.40 | 18 | 87.00 | 21.16 | -0.56 | 28 | 0.583 |
| Socialization | 12 | 85.25 | 13.00 | 18 | 96.44 | 14.79 | 2.13 | 28 | 0.042 |

# APPENDIX Q

Mean Standard Scores of Behavior Problems as a Function of Group

No Treatment vs. Combination Treatment

Appendix Q

Mean Standard Scores on Behavior Problems as a Function of Group

| Measures by Subject | Comparison Groups: Healthy N | Healthy M | Healthy SD | Combined N | Combined M | Combined SD | t | df | p |
|---|---|---|---|---|---|---|---|---|---|
| Total Problems | 30 | 51.67 | 9.47 | 12 | 58.42 | 6.30 | -2.27 | 40 | 0.029 |
| Internalizing Problems | 30 | 51.10 | 9.64 | 12 | 61.50 | 8.42 | -3.27 | 40 | 0.002 |
| *Internalizing Problem Domains* | | | | | | | | | |
| Anxious/Depressed | 30 | 55.17 | 6.55 | 12 | 60.33 | 8.40 | -2.13 | 40 | 0.039 |
| Withdrawn/Depressed | 30 | 55.03 | 6.11 | 12 | 59.25 | 7.09 | -1.93 | 40 | 0.061 |
| Somatic Complaints | 30 | 53.57 | 4.87 | 12 | 60.25 | 10.58 | -2.10 | 40 | 0.056 |
| Externalizing Problems | 30 | 51.27 | 9.27 | 12 | 54.42 | 7.05 | -1.06 | 40 | 0.297 |
| *Externalizing Problems Domains* | | | | | | | | | |
| Rule-Breaking Behavior | 30 | 54.07 | 4.90 | 12 | 53.58 | 4.50 | 0.30 | 40 | 0.769 |
| Aggressive Behavior | 30 | 54.73 | 5.45 | 12 | 56.83 | 5.73 | -1.11 | 40 | 0.273 |
| *Other Problems* | | | | | | | | | |
| Social Problems | 30 | 54.47 | 5.58 | 12 | 57.00 | 5.46 | -1.34 | 40 | 0.189 |
| Thought Problems | 30 | 56.77 | 5.97 | 12 | 60.42 | 4.27 | -2.22 | 40 | 0.035 |
| Attention Problems | 30 | 55.07 | 7.11 | 12 | 58.08 | 4.87 | -1.35 | 40 | 0.186 |

# APPENDIX R

Mean Standard Scores of Behavior Problems as a Function of Group

No Treatment vs. Chemotherapy Only

Appendix R

Mean Standard Scores on Behavior Problems as a Function of Group

| Measures by Subject | Comparison Groups: Healthy N | M | SD | Chemotherapy N | M | SD | t | df | p |
|---|---|---|---|---|---|---|---|---|---|
| Total Problems | 30 | 51.67 | 9.47 | 18 | 56.47 | 8.68 | -1.65 | 43 | 0.107 |
| Internalizing Problems | 30 | 51.10 | 9.64 | 18 | 60.33 | 10.72 | -2.92 | 43 | 0.006 |
| *Internalizing Problem Domains* | | | | | | | | | |
| Anxious/Depressed | 30 | 55.17 | 6.55 | 18 | 59.53 | 8.54 | -1.90 | 43 | 0.064 |
| Withdrawn/Depressed | 30 | 55.03 | 6.11 | 18 | 57.60 | 9.88 | -1.08 | 43 | 0.288 |
| Somatic Complaints | 30 | 53.57 | 4.87 | 18 | 62.13 | 8.07 | -3.78 | 43 | 0.001 |
| Externalizing Problems | 30 | 51.27 | 9.27 | 18 | 50.67 | 7.45 | 0.22 | 43 | 0.829 |
| *Externalizing Problems Domains* | | | | | | | | | |
| Rule-Breaking Behavior | 30 | 54.07 | 4.90 | 18 | 52.67 | 2.61 | 1.03 | 43 | 0.308 |
| Aggressive Behavior | 30 | 54.73 | 5.45 | 18 | 53.87 | 5.59 | 0.50 | 43 | 0.621 |
| *Other Problems* | | | | | | | | | |
| Social Problems | 30 | 54.47 | 5.58 | 18 | 57.93 | 7.44 | -1.59 | 43 | 0.125 |
| Thought Problems | 30 | 56.77 | 5.97 | 18 | 56.27 | 5.75 | 0.27 | 43 | 0.790 |
| Attention Problems | 30 | 55.07 | 7.11 | 18 | 57.33 | 9.91 | -0.88 | 43 | 0.383 |

APPENDIX S

Mean Standard Scores of Behavior Problems as a Function of Group

Chemotherapy only vs. Combination Treatment

Appendix S

Mean Standard Scores on Behavior Problems as a Function of Group

| Measures by Subject | Comparison Groups: Combination | | | Chemotherapy | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | t | df | p |
| Total Problems | 12 | 58.42 | 6.30 | 18 | 56.47 | 8.68 | -0.65 | 25 | 0.521 |
| Internalizing Problems | 12 | 61.50 | 8.42 | 18 | 60.33 | 10.72 | -0.31 | 25 | 0.760 |
| *Internalizing Problem Domains* | | | | | | | | | |
| Anxious/Depressed | 12 | 60.33 | 8.40 | 18 | 59.53 | 8.54 | -0.24 | 25 | 0.810 |
| Withdrawn/Depressed | 12 | 59.25 | 7.09 | 18 | 57.60 | 9.88 | -0.49 | 25 | 0.631 |
| Somatic Complaints | 12 | 60.25 | 10.58 | 18 | 62.13 | 8.07 | 0.53 | 25 | 0.604 |
| Externalizing Problems | 12 | 54.42 | 7.05 | 18 | 50.67 | 7.45 | -1.33 | 25 | 0.195 |
| *Externalizing Problems Domains* | | | | | | | | | |
| Rule-Breaking Behavior | 12 | 53.58 | 4.50 | 18 | 52.67 | 2.61 | -0.63 | 25 | 0.540 |
| Aggressive Behavior | 12 | 56.83 | 5.73 | 18 | 53.87 | 5.59 | -1.36 | 25 | 0.188 |
| *Other Problems* | | | | | | | | | |
| Social Problems | 12 | 57.00 | 5.46 | 18 | 57.93 | 7.44 | 0.36 | 25 | 0.720 |
| Thought Problems | 12 | 60.42 | 4.27 | 18 | 56.27 | 5.75 | -2.08 | 25 | 0.048 |
| Attention Problems | 12 | 58.08 | 4.87 | 18 | 57.33 | 9.91 | -0.24 | 25 | 0.813 |

# APPENDIX T

Mean Standard Scores of Academic Difficulty as a Function of Group

No Treatment vs. Combination Treatment

Appendix T

Mean Standard Scores on a Measure of Academic Achievement as a Function of Group

| | Comparison Groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measures by Subject | Healthy | | | Combination | | | | | |
| | N | M | SD | N | M | SD | t | df | p |
| Science Scale | 24 | 2.08 | 1.32 | 11 | 3.09 | 1.76 | -1.89 | 33 | 0.068 |
| Math Scale | 26 | 2.65 | 1.96 | 12 | 4.58 | 2.57 | -2.55 | 36 | 0.015 |
| Reading Scale | 14 | 1.85 | 1.51 | 9 | 5.89 | 3.22 | -3.52 | 21 | 0.005 |
| Writing Scale | 13 | 2.38 | 2.29 | 9 | 6.89 | 2.98 | -4.01 | 20 | 0.001 |
| English Scale | 15 | 1.67 | 1.11 | 4 | 5.75 | 2.87 | -2.78 | 17 | 0.063 |
| Social Studies Scale | 20 | 2.00 | 1.30 | 9 | 4.33 | 3.08 | -2.19 | 9.3 | 0.056 |
| History Scale | 8 | 1.50 | 0.76 | 1 | 1.00 | - | 0.62 | 7 | 0.553 |
| Foreign Language Scale | 9 | 2.67 | 1.94 | 2 | 3.50 | 0.71 | -0.58 | 9 | 0.577 |
| Art Scale | 20 | 1.45 | 1.36 | 9 | 2.56 | 1.59 | -1.93 | 27 | 0.065 |
| Music Scale | 19 | 1.47 | 1.84 | 8 | 2.50 | 1.69 | -1.36 | 25 | 0.188 |
| Physical Education | 22 | 1.27 | 1.08 | 8 | 2.00 | 1.31 | -1.55 | 28 | 0.133 |

# APPENDIX U

Mean Standard Scores of Academic Difficulty as a Function of Group

No Treatment vs. Chemotherapy Only

Appendix U

Mean Standard Scores on a Measure of Academic Achievement as a Function of Group

| | Comparison Groups | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measures by Subject | Healthy | | | Chemotherapy | | | | | |
| | N | M | SD | N | M | SD | t | df | p |
| Science Scale | 24 | 2.08 | 1.32 | 10 | 2.40 | 2.32 | -0.51 | 32 | 0.616 |
| Math Scale | 26 | 2.65 | 1.96 | 10 | 3.00 | 1.76 | -0.49 | 34 | 0.629 |
| Reading Scale | 14 | 1.85 | 1.51 | 8 | 2.88 | 2.59 | -1.17 | 20 | 0.254 |
| Writing Scale | 13 | 2.38 | 2.29 | 8 | 3.50 | 2.93 | -0.98 | 19 | 0.342 |
| English Scale | 15 | 1.67 | 1.11 | 2 | 1.00 | 0.00 | 0.82 | 15 | 0.423 |
| Social Studies Scale | 20 | 2.00 | 1.30 | 9 | 3.11 | 2.89 | -1.45 | 27 | 0.160 |
| History Scale | 8 | 1.50 | 0.76 | 1 | 1.00 | - | 0.62 | 7 | 0.553 |
| Foreign Language Scale | 9 | 2.67 | 1.94 | 2 | 1.00 | 0.00 | 1.17 | 9 | 0.273 |
| Art Scale | 20 | 1.45 | 1.36 | 10 | 2.10 | 2.42 | -0.79 | 28 | 0.446 |
| Music Scale | 19 | 1.47 | 1.84 | 10 | 1.20 | 0.42 | 0.46 | 27 | 0.648 |
| Physical Education | 22 | 1.27 | 1.08 | 10 | 2.00 | 2.21 | -1.26 | 30 | 0.216 |

# APPENDIX V

Mean Standard Scores of Academic Difficulty as a Function of Group

Chemotherapy Only vs. Combination Treatment

Appendix V

Mean Standard Scores on a Measure of Academic Achievement as a Function of Group

| Measures by Subject | Comparison Groups: Combination | | | Chemotherapy | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | M | SD | N | M | SD | t | df | p |
| Science Scale | 11 | 3.09 | 1.76 | 10 | 2.40 | 2.32 | -0.77 | 19 | 0.448 |
| Math Scale | 12 | 4.58 | 2.57 | 10 | 3.00 | 1.76 | -1.65 | 20 | 0.115 |
| Reading Scale | 9 | 5.89 | 3.22 | 8 | 2.88 | 2.59 | -2.11 | 15 | 0.052 |
| Writing Scale | 9 | 6.89 | 2.98 | 8 | 3.50 | 2.93 | -2.36 | 15 | 0.032 |
| English Scale | 4 | 5.75 | 2.87 | 2 | 1.00 | 0.00 | -2.21 | 4 | 0.092 |
| Social Studies Scale | 9 | 4.33 | 3.08 | 9 | 3.11 | 2.89 | -0.87 | 16 | 0.398 |
| History Scale | 1 | 1.00 | - | 1 | 1.00 | - | - | - | - |
| Foreign Language Scale | 2 | 3.50 | 0.71 | 2 | 1.00 | 0.00 | -5.00 | 2 | 0.038 |
| Art Scale | 9 | 2.56 | 1.59 | 10 | 2.10 | 2.42 | -0.48 | 17 | 0.639 |
| Music Scale | 8 | 2.50 | 1.69 | 10 | 1.20 | 0.42 | -2.12 | 16 | 0.031 |
| Physical Education | 8 | 2.00 | 1.31 | 10 | 2.00 | 2.21 | 0.00 | 16 | 1.000 |

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